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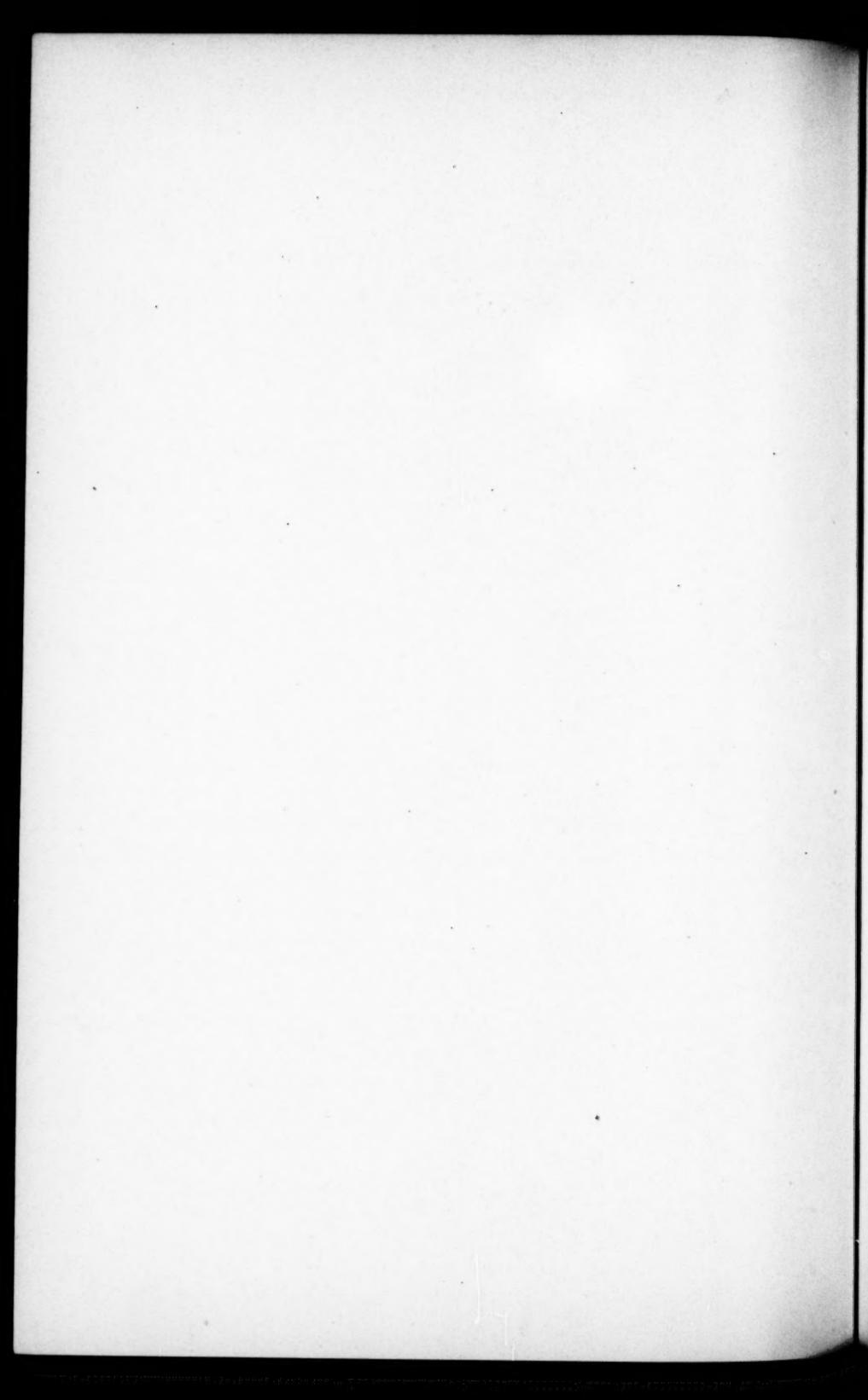
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**CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY.**

NEW SERIES.—No. XLI.

BY SIDNEY F. BLAKE.

- I. A Redisposition of the Species heretofore referred to *Leptosyne*.
- II. A Revision of *Encelia* and some related Genera.



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I. A REDISPOSITION OF THE SPECIES HERETOFORE
REFERRED TO LEPTOSYNE.

AMONG the numerous genera of the Helianthoid *Compositae* scarcely any has had a more involved history than the genus *Coreopsis* L., its synonymy embracing more than a score of generic names. On the one hand closely allied to the still larger genus *Bidens*, and perhaps not clearly separable from it, it is related on the other to various smaller and much more distinct genera. One group of about a dozen species, characterized by fertile rays and the presence of an annulus on the tube of the disk-flowers, has by many authors been kept distinct under the name *Leptosyne* DC., but by Bentham and Hooker,¹ Hoffmann,² and more recently by Hall,³ has been reduced to *Coreopsis*, apparently with justice. In habit, involucre, and achenes its members are closely similar to various species of genuine *Coreopsis*; and while most of the species have a thickened hairy annulus at base of throat in the disk-corollas, this is glabrous in some species⁴ and entirely absent in others,⁵ while the rays although usually fertile are sometimes sterile or neutral in the section *Pugionipappus*; so that in the absence of any quite constant diagnostic character and because of the general very close similarity, it seems advisable to follow the authorities above mentioned in referring the genus definitely to *Coreopsis*.

The genus *Coreocarpus* Bentham, on the other hand, although made a section of *Leptosyne* by Gray and included by Hoffmann in his section *Leptosyne* of *Coreopsis*, departs in its isomorphic involucral scales so

¹ Gen. Pl. ii. 385 (1873).

² In Engler & Prantl, Nat. Pfl. iv. Ab. 5. 243 (1890).

³ Univ. Calif. Pub. Bot. iii. 139 (1907).

⁴ *L. maritima*, *L. gigantea*.

⁵ *L. mexicana*, *L. insularis*; and *Electra* has no annulus.

strikingly from the distinct dimorphism of the bracts, running with considerable uniformity through the whole *Coreopsis* series, as to deserve generic rank. The bracts are imbricated in two rows, subequal and all similar, subherbaceous, and ovate, which in connection with the cymosely panicled small heads makes the genus easy of recognition.

A scapose Mexican perennial, *Leptosyne pinnata* Robinson, described from material without ripe fruit and referred to this genus with considerable doubt, proves to confirm in acheneal characters the distinctness already suggested by habit and is described further on as a new genus.

The relation of the groups in question would seem to be best shown thus:

COREOPSIS L. (*κόπις* bug, and *ὅψ* likeness, from the form of the achene in the original species, *C. lanceolata* L.) Heads radiate or rarely and abnormally discoid, the flowers all yellow; rays neutral or styliferous and fertile or rarely sterile, disk-flowers mostly fertile. *Involucre double, scales of each series slightly connate at base; the inner membranaceous, 1-2-rowed, brown or yellow; the outer narrower (except in C. calliopisidea), herbaceous, usually shorter than the inner.* Receptacle flat or nearly so; pales flat, membranaceous. Ray-florets ligulate, entire or 2-3-dentate; disk-florets regular, tubular, with slightly enlarged throat and (4-)5-toothed limb, often with a thickened glabrous or pilose ring at base of throat. Anthers entire or barely bidentate at base. Style-tips truncate or with short subulate hispid appendages. Achenes obcompressed, sometimes meniscoid and much thickened on one face, orbicular to oblong, those of the ray when fertile commonly broader than the others, glabrous or pubescent, sometimes villous on the margins, wingless or with a chartaceous wing sometimes pectinately lobed, eappose or with two teeth, short ciliate scales, or glabrous or upwardly hispidulous awns or scales, or with a small cupule in place of pappus.—Herbs or rarely shrubs, glabrous or pubescent. Leaves alternate or usually opposite, undivided and entire or toothed, or ternate, or usually ternately or pinnately dissected. Heads of medium size, solitary or corymbose-panicled.—Gen. 263, no. 670 (1737), and Sp. Pl. ii. 907 (1753), in part.

Subgenus **Leptosyne** (DC.) Blake, n. comb. Rays styliferous, mostly fertile, rarely neutral in the section *Pugionopappus*; disk-flowers usually with a thickened and generally hairy annulus at base of throat.—*Leptosyne* DC. Prod. v. 531 (1836); Gray, Proc. Am. Acad. xvii. 218 (1882), Syn. Fl. i. pt. 2. 299 (1884). *Coreopsis* sect. *Leptosyne*

O. Hoffm. in Engler & Prantl, Nat. Pfl. iv. Ab. 5. 243 (1890) (excluding *Epilepis*, *Coreocarpus*, and *Acoma*).—Twelve species, ranging from California to Guatemala, chiefly Mexican.

Sect. 1. **Electra** (DC.) Blake, n. comb. Suffruticose, with opposite oval to lanceolate coriaceous sometimes ternately parted leaves. Heads solitary or paniculate-corymbose, radiate. Outer involucral scales about 5, oblong; inner about 8, longer, oval-oblong. Rays about 5, 2-3-dentate, oblong to elliptic, fertile, the tube pubescent; disk-flowers with pubescent tube shorter than the cylindric-funnelform throat, and (4-)5-toothed limb; annulus none. Style-branches with subulate hispid appendages. Achenes strongly ob-compressed, glabrous, margined, the outer broad, the inner much narrower, all pappusless or the inner rarely with a pair of smooth slender awns.—*Electra* DC. Prod. v. 630 (1836); Gray, Pl. Wright. i. 110, footnote (1852).—Three species of Mexico and Central America.

* Heads numerous in ternate corymbose panicles.

1. *C. MEXICANA* (DC.) Hemsl. Shrubby, nearly glabrous, 0.6-2 m. high; leaves lanceolate to lance-ovate, acute to acuminate at both ends, sharply serrate, often trifoliate cut nearly to the midrib, glabrate on both sides or retaining a sparse pubescence chiefly along the veins, the blades 4-11 cm. long, on narrowly margined petioles 1-2.5 cm. long; heads 1-1.3 cm. high, 2.5-4 cm. in diameter including rays; achenes 6-9 mm. long.—Biol. Centr.-Am. Bot. ii. 196 (1881). *Electra mexicana* DC. l. c. *Electra Galeottii* Gray, l. c. *Coreopsis Galeottii* Hemsl. l. c. 195.—In an authentic example of *E. mexicana* in the Gray Herbarium, collected by Mendez, the tube of the ray is distinctly hirtellous, and the narrowly lanceolate leaves still show a slight appressed pubescence beneath, while one of the younger heads is also sparingly hairy at the base, so that the characters relied upon by Dr. Gray in separating *E. Galeottii* entirely fail to hold. *Galeotti* 2086, represented by a fragment in the Gray Herbarium, as well as the Baites specimens cited in the original description, is practically glabrous, while *Galeotti* 2087 somewhat approaches the next form.

GUANAJUATO: "circa Villalpando ultra Guanajuato," Mendez (COTYPE in Gray Herb.); Guanajuato, 1895, Dugès 472; near Cadereyta, 22 Aug. 1905, Rose 9717; HIDALGO: sunny rocky slopes, Pachuca, Sept. 1905, Purpus 1550; clay banks, Dublan, alt. 2070 m., 15 Oct. 1902, Pringle 9895; Sierra de Pachuca, 2900 m., 14 Sept. 1899, Pringle 8218; near Metepic Station, 2530 m., 20 Sept. 1904, Pringle 13041; MEXICO: barranca above Santa Fe, 2600 m., 1 Sept.

1905, *Pringle* 13547; OAXACA: Cerro San Antonio, 1650 m., 26 June 1906, *Conzatti* 1431; CHIAPAS: 1864-1870, *Ghiesbreght* 133, 539 (both with panicle and under side of leaves along veins loosely pubescent); Mexico without locality: 1864, *Bailes*; *Galeotti* 2086, 2087 (TYPES of *E. Galeottii* Gray, in Gray Herb.). GUATEMALA: Dept. Alta Verapaz, Dec. 1907, *Türckheim* II 2043 (large-leaved); Dept. Amatitlan, near Amatitlan, 20 July 1860, *Sutton Hayes*; Dept. Jalapa, Laguna de Ayarza, Sept. 1892, *Heyde & Lux* 3792.

1 β . *C. MEXICANA* (DC.) Hemsl. var. **hyperdasya** Blake, n. var., foliis infra ubique dense pubescentibus, supra venis exceptis glabratiss vel scabriusculis, caulinis et gemmis et inflorescentia fuscis cum pilis tomentosis lente subglabratiss.—OAXACA: ravines of hills near Oaxaca, 1830 m., Sept. 1894, *Pringle* 4896 (TYPE SHEET in Gray Herb.); La Carbonera, 2165 m., 20 Sept. 1895, *L. C. Smith* 808; Cerro de San Felipe, 2000 m., 1 Sept. 1897, *Conzatti & González* 545, 546; San Juan del Estado, 18-June 1894, *L. C. Smith* 25; near Reyes, 1830-2290 m., 17 Oct. 1894, *Nelson* 1718 (approaching the next form); HIDALGO: Mineral del Monte, *C. Ehrenberg* 354.

1 γ . *C. MEXICANA* (DC.) Hemsl. var. **HYPERRADSYA** Blake f. **holotricha** Blake, n. forma, foliis parvis utrinque cineraceis pube densa subscabra.—PUEBLA: vicinity of San Luis Tultitlanapa, July 1908, *Purpus* 3099 (TYPE SHEET in Gray Herb.).

* * Heads long-peduncled, solitary or rarely somewhat paniced.
← Leaves 2-5 cm. long, cuneately oblanceolate or obovate; disk-corollas 5-toothed.

2. *C. CUNEIFOLIA* Greenm. Suffruticose, trichotomously branched, the young growth pubescent, later glabrate; leaves pale green especially beneath, with a few loose hairs when young, mucronately 5-11-toothed above the middle, tapering to a sessile margined base; heads 8-10 mm. high, 2 cm. across the rays.—Proc. Am. Acad. xl. 43 (1904).—JALISCO: dry rocky mountains above Etzatlan, 2 Oct. 1903, *Pringle* 8781; Sierra de San Esteban, near Guadalajara, 1830 m., 21 Oct. 1903, *Pringle* 11900; DURANGO: 16 Aug. 1897, *Rose* 2344.

++ Leaves 1-2 cm. long, oval; disk-corollas 4-toothed.

3. *C. parvifolia* Blake, n. sp., fruticosa trichotome ramosa juventate appresse pubescens denique glabrata cortice cano; foliis parvis 1-2 cm. longis ovalibus supra appresse pubescentibus infra paullum crinitis vel glabratiss supra partem inferiorem integrum utroque ca. 5-mucronato-dentatis, summis imminutis subintegris; pedunculis solitariis ramos terminantibus 3-6.5 cm. longis subpubescentibus;

capitulis 1-1.5 cm. altis 3 cm. diametro (radiis inclusis); squamis exterioribus suberinitis oblongo-spatulatis obtusis, interioribus oblongis obtusis apice fimbriatis (8-10 mm. longis 4-5 mm. latis); radiis ca. 5 ovalibus 13 mm. longis 8 mm. latis; corollis disci 7 mm. longis infra hirtellis 4-dentatis.—PUEBLA: dry rocky hillsides, Esperanza, Aug. 1907, *Purpus* 2581 (TYPE in Gray Herb.).

Sect. 2. **Anathysana** Blake, n. sect., herbae perennes caulinibus pluribus radice lignea foliis oppositis integris vel pinnatifloribus lobis paucis filiformi-linearibus. Involucrum ut apud §1, squamis interioribus 8-12. Flosculi radii fertiles; ei disci saepius exannulati. Styli rami apice incrassati breviter appendiculati. Achenia ut apud §1, epapposa.—Type species *Leptosyne mexicana* Gray (= *C. cyclocarpa* Blake).—Three species of Mexico and Socorro Island.

* Leaves entire, linear-filiform.

4. *C. cyclocarpa* Blake, n. nom. Stems numerous from a thick woody base, 6-7 dm. high, slightly pubescent below; leaves 2-6 cm. long, entire or very rarely 3-lobed from near the middle, ciliate at base; heads rather few, long-peduncled, 6-8 mm. high, 1.5-2.5 cm. in diameter including the 8-10 rays; outer scales about half as long as inner; disk-florets exannulate.—*Leptosyne mexicana* Gray, in Wats. Proc. Am. Acad. xxii. 429 (1887), not *C. mexicana* (DC.) Hemsl. (1881).—Named from the orbicular indistinctly margined achenes, those of the ray 4.5 by 4.5 mm.—JALISCO: Rio Blanco, Sept. 1886, Palmer 568 (TYPE of *L. mexicana* in Gray Herb.); near Guadalajara, 10 Sept. 1890, Pringle 3570, 24 Sept. 1891, Pringle 3841, 4 Oct. 1903, Pringle 11546.

* * Leaves pinnately divided into 3-7 linear lobes, the uppermost sometimes entire.

— Heads larger, inner involucre 6-8 mm. long; leaves mostly with 3 lateral pairs of lobes; disk-flowers with hairy annulus.

5. *C. pinnatisecta* Blake, n. nom. In habit, pubescence, and involucre very similar to the last; leaves 2-3 cm. long, the lobes mucronate-tipped; achenes obovate, 3.5-4 mm. long, 2.5 mm. broad.—*Leptosyne Pringlei* Rob. & Greenm. Am. Journ. Sci. ser. 3. I. 155 (1895), not *C. Pringlei* Rob. Proc. Am. Acad. xlili. 41 (1907).—OAXACA: Sierra de San Felipe, 2135 m., 7 Aug. 1894, Pringle 4871 (TYPE in Gray Herb.); PUEBLA: Cerro de Paxtle, near San Luis Tultitlanapa, Sept. 1909, *Purpus* 4098.

++ + Heads smaller, inner scales 4-5 mm. long; leaves mostly with 1 pair of lobes; disk-flowers exannulate.

6. *C. insularis* (Brandeg.) Blake, n. comb. Decumbent (base unknown), nearly glabrous; leaves 1-2.5 cm. long, 3-5-lobed; heads axillary and terminal, about 1.3 cm. in diameter including the small rays; outer bracts $\frac{2}{3}$ as long as inner; achene 4.2 mm. long.—*Leptosyne insularis* Brandeg. *Erythea* vii. 5 (1899).—SOCORRO ISLAND: March-June 1897, Anthony 394 (TYPE COLLECTION): 27 May-3 July 1903, F. E. Barkelew 223.

Sect. 3. *Tuckermannia* (Nutt.) Blake, n. comb. Stout perennials, with alternate fleshy 2-3-pinnately dissected leaves and large heads. Outer involucral scales 5-8, lance-oblong, about equaling the inner; the latter about 12, oblong. Rays large, fertile. Disk-flowers with nearly glabrous annulus. Achenes obcompressed, glabrous, narrowly winged, epappose or rarely with margins produced into short teeth or awns.—*Tuckermannia* Nutt. *Trans. Am. Philos. Soc.* ser. 2. vii. 363 (1841). *Leptosyne* sect. *Tuckermannia* Gray, *Bot. Calif.* i. 356 (1876), & *Syn. Fl.* i. pt. 2. 300 (1884).—Two species of California, Lower California, and adjacent islands.

* Heads few, on very long naked peduncles, 6-8 cm. broad including rays.

7. *C. MARITIMA* (Nutt.) Hook. fil. Stems fleshy-herbaceous, spreading, 3-8 dm. high, from a thick woody base; leaf-lobes linear, 1.5-3 mm. broad; peduncles 2-5 dm. long; rays 14-20; achenes rarely with 2 teeth or awns.—*Bot. Mag.* t. 6241 (1876). *Tuckermannia maritima* Nutt. l. c. *Leptosyne maritima* Gray, *Proc. Am. Acad.* vii. 358 (1868).—Coast of San Diego County, California, northern Lower California, and adjacent islands.

* * Heads numerous, cymosely clustered toward tips of branches on peduncles mostly 1-1.5 dm. long, smaller (5-6 cm. broad).

8. *C. GIGANTEA* (Kellogg) Hall. Stems fleshy-woody, erect, 3-30 dm. high, often 1 dm. thick; leaves mostly clustered toward tips of branches; leaf-lobes finer, 1-1.5 mm. broad; rays 10-16; pappus none.—*Univ. Calif. Pub. Bot.* iii. 142 (1907). *Leptosyne gigantea* Kell. *Proc. Calif. Acad.* iv. 198 (1872).—Coast of southern California and islands, from Los Angeles County to San Luis Obispo County; also Guadalupe Island, Lower California.—A form occurs on San Nicolas Island (*Blanche Trask* 76, in part) with discoid heads, the receptacle very chaffy, the disk-florets showing dialysis of corolla with more or less complete abortion of sexual organs.

Sect. 4. *Pugipappus* (Gray) Blake, n. comb. Annuals, branched

from the base, with 2-3-pinnatifid leaves mostly basal, and medium-sized heads solitary on long nearly naked peduncles. Outer involucral scales 5-7; inner about 8. Rays usually styliferous and fertile, sometimes neutral or with short included styles, broad and many-nerved. Disk-flowers with bearded ring. Achenes dimorphous: those of ray epappose, corky-margined and more or less corky-ridged on the faces; those of disk long-villous on margins, bearing a pair of linear-lanceolate denticulate paleae.—*Agarista* DC. Prod. v. 569 (1836), not D. Don 1834 (*Ericaceae*). *Pugio pappus* Gray, Pacif. R. Rep. iv. 104 (1857). *Leptosyne* sect. *Pugio pappus* Gray, Syn. Fl. l. c.—Two species of southern California.

* Outer scales linear-lanceolate.

9. C. *BIGELOVII* (Gray) Hall. Simple or branched below, 1-6 dm. high; leaves 5-10 cm. long, or smaller in starved specimens; outer scales 6-11 mm. long, the inner ovate, 8-12 mm. long; rays 1-2 cm. long; disk-achenes black, 6 mm. long, glabrous on both faces or slightly pubescent on inner, twice as long as the awns.—Univ. Calif. Pub. Bot. iii. 141 (1907). *Pugio pappus Bigelovii* Gray, Pacif. R. Rep. l. c. *Leptosyne Bigelovii* Gray, Syn. Fl. l. c. *P. Breweri* Gray, Proc. Am. Acad. viii. 660 (1873). *L. hamiltonii* Elmer, Bot. Gaz. xli. 323 (1906).—Southern California, not on the coast, from Tulare County to the Colorado Desert.—The annulus of the disk-flowers, in the types and other specimens examined, is very distinctly bearded, not glabrous as originally described and as repeated in the *Synoptic Flora* and by Hall.

* * Outer scales deltoid-ovate.

10. C. *CALLIOPSIDEA* (DC.) Gray. Rather stouter and more leafy-stemmed, with broader leaf-lobes; outer scales united for about half their length, the free deltoid tips 5-6 mm. long; inner scales 11-14 mm. long; rays 1-2.5 cm. long; disk-achenes villous on inner face, nearly equaled by their pappus.—Bot. Mex. Bound. 90 (1859). *Agarista calliopsisidea* DC. Prod. v. 569 (1836). *Leptosyne calliopsisidea* Gray, Syn. Fl. l. c. *L. calliopsisidea* var. *nana* Gray, l. c. (a dwarfed form). *Pugio pappus calliopsisidea* Gray, Proc. Am. Acad. viii. 660 (1873). *P. calliopsisidea* Gray, Bot. Calif. i. 355 (1876).—Southern California, from Cholame (San Luis Obispo County) to Santa Barbara County and the Mohave Desert; north to middle California according to Hall.

Sect. 5. ***Euleptosyne*** (Gray) Blake, n. comb. Similar to last section in habit and involucre (outer scales linear); rays glabrous, fertile. Disk-flowers with an annulus, nearly glabrous in one species. Style-

branches enlarged at tip, short-appendaged. Achenes coryk-winged, sometimes meniscoid, with a cupule in place of pappus.—*Leptosyne* sect. *Euleptosyne* Gray, *Syn. Fl. i. pt. 2. 299 (1884)*.—Two species of Arizona, California, and northern Lower California.

* Achenes with numerous clavellate hairs on both faces; disk-corollas with bearded annulus; leaf-divisions nearly filiform.

11. *C. DOUGLASII* (DC.) Hall. Scapes solitary or few, 1-3.5 dm. high; leaves chiefly in a dense basal tuft, entire or mostly 1-2-pinnately dissected into linear-filiform lobes, 2-10 cm. long; outer involucral scales linear, 5-8 mm. long; inner yellow, scarious-margined, multinervose, ovate, slightly longer.—*Univ. Calif. Pub. Bot. iii. 140 (1907)*. *Leptosyne Douglasii* DC. *Prod. v. 531 (1836)*. *L. californica* Nutt. *Trans. Am. Philos. Soc. ser. 2. vii. 363 (1841)*. *L. Newberryi* Gray, *Proc. Am. Acad. vii. 358 (1868)*.—Southern California and southern Arizona; also San Quentin, Lower California, 1889, *Palmer* 677.

* * Achenes without clavellate hairs, glabrous on outer face, more or less papillose on inner; annulus nearly or quite glabrous; leaf-divisions about 1-1.5 mm. broad.

12. *C. Stillmanii* (Gray) Blake, n. comb. Somewhat stouter than last, more leafy below; coryk margin of achene rugose.—*Leptosyne Stillmanii* Gray, in E. Durand, *Journ. Acad. Nat. Sci. Phila. iii. 91 (1855)*, and in *Torr. Bot. Mex. Bound. 92 (1859)*. *L. Stillmani* Gray, *Bot. Calif. i. 356 (1876)*.—CALIFORNIA: Calaveras Co., *Heermann*; valley of the Sacramento, *Stillman* (TYPE in Gray Herb.); hillsides, Auburn, April 1865, *Bolander* 4520; dry sand hills, Antioch, 16 April 1868-9, *Kellogg & Harford* 439; fields, Middle Tule River, 240-305 m., April-Sept. 1897, *Purpus* 5004.

COREOCARPUS Benth. (*κόρη* bug, and *καρπός* fruit, from the peculiar achenes). Heads heterogamous, radiate, the flowers all yellow; rays stilyferous, fertile, disk-flowers mostly fertile. Involucral scales 5-8, 2-rowed, subequal, submembranaceous, dark-lineate, ovate to ovate-oblong, the outer obtusish, the inner acuminate; heads sometimes with a few bractlets at base. Receptacle flat, with narrow membranaceous pales subtending the flowers. Ligules small, 4-5-nerved, entire or emarginate; disk-corollas regular, tubular, with slightly enlarged funnelliform throat and 5-toothed limb, with a hairy annulus at base of throat. Style-branches with subulate hispid appendages. Anthers entire at base. Achenes obcompressed, with an

entire or pectinately cut crustaceous wing, calvous or with two retrorsely hispidulous slender awns, often granular on one or both faces.—Annuals or suffrutescent perennials, with opposite 1-2-pinnately divided leaves, and small slender-peduncled heads (less than 2 cm. in diameter including the rays) in somewhat ternate cymose clusters at the ends of the branches.—Bot. Voy. Sulph. 28, t. 16 (1844); Gray, Proc. Am. Acad. v. 162 (1861). *Acomia* Benth. l. c. 29, t. 17 (1844). *Leptosyne* sect. *Coreocarpus* Gray, Syn. Fl. i. pt. 2. 301 (1884).—Three species of the Sonoran region.—Well distinguished by inflorescence, and by the involucre of few similar scales, not double as in all members of the genus *Coreopsis*.

* Herbaceous annuals.

1. *C. PARTHENIOIDES* Benth. Slender, 2-4 dm. high, branched above, nearly glabrous, bearing few heads in somewhat ternate terminal clusters; leaf-blades 2-4.5 cm. long on petioles nearly as long, somewhat thickish, bipinnatifid, the primary lobes deltoid, 1-2 cm. long, nearly as broad, entire or 3-4-lobed with broad divisions; heads 5-6.5 mm. high, about 1 cm. broad including the rays; rays oval, about 5, 5 mm. long, yellow, often drying whitish with purplish veins; achenes oblong, crenate-margined, in the only specimens examined; figured by Bentham as oval, shortly 2-awned, with imperfectly dissected wing.—Bot. Voy. Sulph. 28, t. 16 (1844). *Leptosyne parthenoides* Gray, l. c.—Bentham's type came from Bay of Magdalena, Lower California. The only specimens examined are: SONORA: high in the mountains, Guaymas, Oct. 1887, Palmer 299.

1 β . *C. PARTHENIOIDES* Benth. var. *heterocarpus* (Gray) Blake, n. comb. Leaves bi-tripinnatifid with finer divisions, the ultimate ones nearly linear; margin of achenes entire and incurved or dissected into lobes; awns sometimes present.—*Coreocarpus heterocarpus* Gray, Proc. Am. Acad. v. 162 (1861). *Leptosyne heterocarpa* Gray, Syn. Fl. l. c. *L. dissecta* Gray, l. c. (as to plant, not synonym). *L. parthenoides* var. *dissecta* Wats. Proc. Am. Acad. xxiv. 56 (1889), as to plant cited, not as to name-bringing synonym. *Coreocarpus involutus* Greene, Pittonia, i. 290 (1889).—While *C. heterocarpus* Gray appears to be merely a form of *C. parthenoides*, as long ago suggested by Dr. Watson, indistinguishable by achenial characters alone, it nevertheless differs sufficiently in foliar characters to retain varietal rank. *C. involutus* Greene, of which no authentic specimen has been seen, is judging from the description inseparable from this variety. Plants collected by Brandegee on Natividad Island and distributed as this

species are slightly stouter and more pubescent than any other specimens examined but show no essential differences.—LOWER CALIFORNIA: Lagoon Head, Mar. 1889, *Palmer* 795; Natividad Island, 10 April 1897, *Brandegee*; Cape San Lucas, &c., Aug. 1859—Jan. 1860, *Xantus* 62 (TYPE of *C. heterocarpus*); San José del Cabo, 8 Mar. 1892, *Brandegee* 339; La Paz, 20 Jan.—5 Feb. 1890, *Palmer* 19; Santa Agueda, 4–6 Mar. 1890, *Palmer* 248; mountain sides, Los Angeles Bay, Dec. 1887, *Palmer* 660; Lower California, without locality, *Dr. Street*.

* * Suffrutescent perennials.

→ Achene-wing pectinately dissected.

2. *C. arizonicus* (Gray) Blake, n. comb. Much branched from a woody base, nearly or quite glabrous; leaves 7–10.5 cm. long, pinnately divided into 3–5 linear lobes 1–3 mm. wide; heads rather numerous in panicled few-headed cymes; involucral scales 5–6 mm. long; rays 5–6, 7 mm. long; achenes with the wing split into flattened cuneate lobes, the inner achenes narrower; retrorsely spinulose awns sometimes present.—*Leptosyne (Coreocarpus) arizonica* Gray, Proc. Am. Acad. xvii. 218 (1882). *Coreopsis arizonica* O. Hoffm. in Engler & Prantl, Nat. Pfl. iv. Ab. 5. 243 (1890).—ARIZONA: along streams, Ft. Lowell, Aug. 1880, *Lemmon* (COTYPE); by streams of the Santa Catalina Mts., 760–1060 m., April 1881, *Pringle* (COTYPE); Santa Catalina Mts., May 1881, *Lemmon* 211; mountains, Lowell, 8 May 1884, *W. F. Parish* 112. SONORA: Touibabi, 18 Nov. 1890, *F. E. Lloyd* 407; Alamos, 1890, *Palmer* 384 (approaching the next form); CHIHUAHUA: southwestern part, 1885, *Palmer* 294.

2β. *C. ARIZONICUS* (Gray) Blake var. *pubescens* (Rob. & Fern.) Blake, n. comb. Whole plant pubescent with short rather soft hairs.—*Leptosyne arizonica* var. *pubescens* Rob. & Fern. Proc. Am. Acad. xxx. 118 (1894).—SONORA: Granados, 905 m., 15 Nov. 1890, *Hartman* 222; Huchuerachi, 1220 m., 5 Dec. 1890, *Hartman* 296; Agnos Blanco, 9 Dec. 1890, *Lloyd* 406.

2γ. *C. ARIZONICUS* (Gray) Blake var. *filiformis* (Greenm.) Blake, n. comb. Leaf-lobes linear-filiform, less than 1 mm. wide, the lower 4–6 cm. long.—*Leptosyne arizonica* var. *filiformis* Greenm. Proc. Am. Acad. xl. 44 (1904).—SINALOA: Sierra de Choix, 80 km. NE. of Choix, 15 Oct. 1898, *Goldman* 258 (COTYPE in Gray Herb.).

++ Achene-wing thick, often rugose, entire or barely crenulate; leaves fleshy, bipinnatifid.

3. *C. dissectus* (Benth.) Blake, n. comb. Suffrutescent, trichotomously branched, glabrous; leaves mostly crowded near the base of

the young branches, 1-2-pinnatifid, 1.5-2.5 cm. long, ternately cut into short fleshy linear lobes, on petioles nearly as long; heads cymosely arranged in nearly naked panicles, as large as those of last species; achenes 4 mm. long, 2.5 mm. broad.—*Acoma dissecta* Benth. Bot. Voy. Sulph. 29, t. 17 (1844). *Leptosyne dissecta* Gray, Syn. Fl. i. pt. 2. 301 (1884), as to synonym. *L. parthenioides* var. *dissecta* Wats. Proc. Am. Acad. xxiv. 56 (1889), as to synonym only.—Bentham's type came from Cape San Lucas. The only specimens examined are three sheets from Magdalena Island, LOWER CALIFORNIA, collected 12 Jan. 1889 by Brandegee (see Brandeg. Proc. Calif. Acad. ser. 2. ii. 176 (1889)).

3β. *C. DISSECTUS* (Benth.) Blake var. *longilobus* Blake, n. var., foliis 5-7.5 cm. longis pinnatiformibus, segmentis (3-5) lineari-filiformibus, lobis inferioribus 2-3 cm. longis 3-5-lobatis; acheniis ut in forma typica sed margine crenulatis.—LOWER CALIFORNIA: Carmen Island, 1-7 Nov. 1890, Palmer 877 (TYPE SHEET in Gray Herb.; distributed as *L. dissecta* Gray).

STEPHANOPHOLIS Blake, n. genus Compositarum Coreopsidearum ($\sigma\tau\epsilon\phi\pi\sigma$ crown, and $\phi\lambda\pi$ scale). Capitula heterogama radiata, radiis fertilibus. Involucrum duplex squamis liberis, exterioribus 5-6 herbaceis obtusis ovato-lanceolatis; interioribus circa 8 submembranaceis ellipticis atroviridis apice rotundatis margine angusto scario fimbriatulo exteriore subaequantibus. Receptaculum conicum, paleis planis membranaceis flavis apice rotundatis. Radii corollae ca. 12 ligulatae oblongae tridentatae supra albidae infra atropumbeae glabrae obscure ca. 8-nervatae. Disci corollae flavae glabrae exannulatae 5-dentatae tubulo breve. Antherae basi subintegrae apice appendice deltoideo munitae. Styli rami apice incrassati. Achenia dimorpha: ea radii valde obcompressa ovalia glabra epapposa; disci paullo crassiora oblonga supra appresse pubescens, pappo coroniformi e squamis brevissimis inaequalibus lacerato-fimbriatis vix junctis ad angulos plus minusve exaggeratis composito.—Herbae perennes scapose pratincolae radicibus fasciculatis caulinibus a foliorum basibus fibrillosis persistentibus lanugine brunnea intermixta vestitis. Folia multa longa integra vel pinnatiformia. Scapi pauci nudi vel 1-2-bracteati capitula solitaria majuscula radiis albidis gerentes. Genus habitu pappo clinio conico bene distinguitur. Type species *Leptosyne pinnata* Rob.—One species with a variety, in mountain meadows of southern Mexico.

1. *S. pinnata* (Rob.) Blake, n. comb. Smooth except base and scapes; leaves 1-3.5 dm. long, with 3-6 pairs of small oblong lobes and a much enlarged slightly glandular-crenulate terminal one 3.5-9.5 cm. long; scapes very rarely branched, densely appressed-pubescent above, exceeding the leaves; head about 1 cm. high, 3 cm. broad including the rays.—*Leptosyne pinnata* Rob. Proc. Am. Acad. xxvii. 176 (1892).—MEXICO: wet meadows, Del Rio, 30 Aug. 1890, *Pringle* 3668 (TYPE in Gray Herb.); wet meadows, Valley of Toluca, 19 Aug. 1892, *Pringle* 4194; wet alpine meadows, Sierra de las Cruces, 2990 m., 28 Aug. 1904, *Pringle* 13067.

1 β . *S. pinnata* (Rob.) Blake var. *integerrifolia* (Greenm.) Blake, n. comb. Leaves entire, narrowly lanceolate, only very slightly crenulate, 1.5-2 dm. long; pappus slightly more developed.—*Leptosyne pinnata* var. *integerrifolia* Greenm. Proc. Am. Acad. xl. 44 (1904).—DURANGO: near El Salto, 12 July 1898, *Nelson* 4580 (COTYPE in Gray Herb.).

II. A REVISION OF ENCELIA AND SOME RELATED GENERA.

In the course of a revision of the genus *Encelia*, as at present understood, it has been found necessary for clearness of definition to remodel the group by the reference of a number of species to the related genera *Viguiera*, *Flourensia*, and *Verbesina*, and by the recognition of several genera long treated as synonymous; and in view of the changes in generic boundaries involved it seems desirable to consider briefly the history of some of these related genera and to contrast their characters.

Only two genera of this immediate relationship were known to Linnaeus. *Helianthus*, characterized by its thickish achenes with promptly deciduous pappus of paleaceous awns and sometimes also squamellae (short intermediate scales), is today taken in its original interpretation, save that the small and very distinct genus *Heliospisis* was later erected by Persoon on one of the original species (*H. laevis*). The Linnaean genus *Verbesina*, on the other hand, was very composite, its ten original species (reducible to nine or eight) representing seven modern genera, two only of the species being now included in the genus. It is well distinguished by the generally fertile rays and the chartaceo-cartilaginous wings of the flat achene, but these being usually invisible or indistinct in the ovary young material is easily

misplaced, and several species of *Verbesina* have been described under *Encelia*.

Encelia Adanson⁶ was based on "Cotula marit. Peruana," cultivated in the Jardin de Roi at Paris, which is *Encelia canescens* Lam.,⁷ an alternate-leaved perennial with epappose achenes villous on the edges and narrowly white-margined. In 1789 L'Héritier⁸ redescribed the plant as *Pallasia halimifolia*, a new genus, quoting as a synonym *Coreopsis limensis* Jacq.,⁹ but not referring to Adanson's genus. The species was again described and figured by Cavanilles¹⁰ in 1791, Lamarek being correctly accredited with the authorship of the species, which has nevertheless since been universally attributed to Cavanilles.

In 1807 Persoon¹¹ described the genus *Simsia*, basing it upon three species published by Cavanilles under *Coreopsis*, of which one, *S. heterophylla*, has since become the type of *Iostephane* Benth., while the others, both reducible to the species long known as *Simsia auriculata* DC. or *Encelia mexicana* Mart., have always been retained in *Simsia* — characterized mainly by the biaristate not villous-edged achene — until that genus was merged with *Encelia* in 1873.

Both genera were recognized by De Candolle in his *Prodromus* in 1836, *Encelia* with four species and *Simsia* with eight, several species being here first published, and the new genus *Armania* Bertero¹² was described, based upon *Hopkirkia fruticulosa* Spreng.,¹³ a species not since identified but certainly a *Simsia*.

In a communication by Gray to the American Academy, apparently first published¹⁴ in 1847, two new genera of this group were proposed, *Barrattia* Gray & Engelmann for a species closely allied to *Simsia* but with epappose achenes, and *Geraea* Torr. & Gray for an annual with narrowly cuneate villous achenes having well developed margin and crown and two strong awns. Two years later both genera were reduced to *Simsia* by Dr. Gray.¹⁵ In Bentham's treatment twenty-four years later in his *Genera Plantarum*¹⁶ they were recognized as sections of *Encelia*, to which *Simsia* was here also for the first time definitely subordinated. Dr. Gray, in a paper of 1883¹⁷ and in the *Synoptical Flora*, carried the reduction a step further by including

⁶ Fam. ii. 128 (1763).

⁷ Encycl. Meth. ii. 356 (1786).

⁸ In Ait. Hort. Kew. iii. 498 (1789).

⁹ Coll. ii. 299 (1788), & Icon. iii. t. 594 (1786-1793).

¹⁰ Icon. i. 45. t. 61 (1791).

¹¹ Syn. ii. 478 (1807).

¹² Prod. v. 576 (1836).

¹³ Sys. iii. 444 (1826).

¹⁴ Am Journ. Sci. ser. 2. iii. 274-5 (Mar. 1847).

¹⁵ Pl. Fendl. 85 (1849).

¹⁶ Gen. Pl. ii. 378 (1873).

¹⁷ Proc. Am. Acad. xix. 7-9 (1883).

Geraea in the section *Euencelia*, and *Barrattia* in *Simsia*. Since Dr. Gray's treatment nothing has been done in the way of a revision of the group as a whole, nor has any new species been described under any of the genera *Pallasia*, *Armania*, *Geraea*, *Barrattia*, or *Simsia* since 1859.

In 1871 D. C. Eaton¹⁸ described as *Tithonia argophylla* a remarkable new species from Utah, with large solitary heads, squamellaceous corona between the awns of the achene, and densely silvery-pubescent basal leaves, which two years later was referred to *Encelia* by Dr. Gray,¹⁹ who at the same time added a very similar new species (*E. nudicaulis*). Ten years after Gray²⁰ transferred them to *Helianthella*, instituting for their reception the new section *Enceliopsis*. In 1909 Aven Nelson²¹ elevated the group to generic rank, mainly on the basis of habit, enumerating five species, one of them new, which I have not been able to separate from *E. nudicaulis*.

Hemsley²² in 1881 listed 17 species of *Encelia* from Mexico, describing one new species and making many new combinations of names which had been first published under *Simsia*.

In recent years the boundaries of the genus *Encelia* have been stretched to include a number of shrubby Mexican species, usually described from material without ripe fruit, which in the light of all their characters require transferral to other genera (*Viguiera*, *Flourensia*, *Verbesina*) if generic distinctions in this group are to be preserved. Six species (*E. hypargyrea*, *maculata*, *montana*, *Pringlei*, *rhombifolia*, *squarrosa*), with achenes plumpish when mature, so far as known, and a persistent pappus of two aristate or paleaceous awns and several short truncate squamellae, exactly agree with *Viguiera* in essential characters and are further on transferred to that genus. Another fascicle of six species (*E. collodes*, *glutinosa*, *microphylla*, *oblonga*, *resinosa*, *suffrutescens*) is not so easily placed owing to lack of ripe fruit in nearly every species, but all differ in more or less essential characters from the true genus *Encelia*, and may by a slight extension of character be included in *Flourensia* DC.²³ This genus, wrongly referred by Bentham²⁴ to *Helianthus*, was based on four species, two radiate Chilean plants and two discoid Mexican species, the latter taken by Gray²⁵ as typical of the genus. One of the Chilean species,

¹⁸ In Wats. Bot. King's Rep. v. 423 (1871).

¹⁹ Proc. Am. Acad. viii. 657 (1873). ²³ Prod. v. 592 (1836).

²⁰ Proc. Am. Acad. xix. 9 (1883). ²⁴ Gen. Pl. ii. 376 (1873).

²¹ Bot. Gaz. xlvi. 432 (1909).

²⁵ Proc. Am. Acad. xix. 7 (1883).

²² Biol. Centr.-Am. Bot. ii. 183-5 (1881).

F. corymbosa DC., is a true *Viguiera* and was transferred to that genus by Gray in 1883 under the new name *V. Poeppigii*, the name *corymbosa* being rejected as inappropriate; but Reiche²⁶ says: "El extremo de los tallos corimboso-ramoso, rara vez indiviso. Cabezuelas terminales en las ramas hacia arriba desnudas"; and in any case the name *corymbosa*, not being preoccupied, must be retained.²⁷ The remaining three species, alternate-leaved glutinous shrubs with villous achenes noticeably thicker than in true *Encelia*, and with a pappus of two slender awns disposed to be trifid from near the base, with or without slender acute squamellae, form a rather definite group which has since been increased to about ten species. Of the six *Encelia*s above mentioned four (*E. collodes*, *microphylla*,²⁸ *oblonga*, *suffrutescens*) agree well with these characters, except that *E. oblonga* and *E. suffrutescens* are scarcely glutinous, while the remaining two species, fully mature fruit of which is greatly to be desired, in their general characters are so close to the others as to justify their allocation here.

The genera *Encelia*, *Geraea*, and *Simsia* are here separated mainly on the strength of characters to which attention has not previously been directed. The fourteen species included in *Encelia* are all perennials with leaves all alternate, achenes very flat, villous at least on margins, narrowly white-bordered and generally pappusless, bluish short-hairy style-branches, and receptacular chaff softly scarious, bluish, falling with the achenes. The two species included in *Geraea* are annuals or biennials, with all or nearly all the leaves alternate, pales as in the last, longer and more hairy style-branches, and narrowly cuneate villous achenes with strong white border, awns, and conspicuous crown, the last represented on the ovary in at least one species by a squamellaceous corona. The twenty-two species included in *Simsia* are mostly annuals, with always some at least of the lower leaves opposite, marginless thin-edged not villous achenes, attenuate hispid style-branches, and stiff acuminate pales persistent long after the achenes have fallen. The characters of these and some related genera are contrasted in the following key.

In the course of this revision some 670 sheets have been studied, representing all the material in the Field Columbian Museum, the

²⁶ Fl. Chile, iv. 93 (1905).

²⁷ *Viguiera corymbosa* (DC.) Blake, n. comb. *Flourensia corymbosa* DC. Prod. v. 592 (1836); Reiche l. c. (q. v. for vars.). *Helianthus corymbosus* Poeppig in DC. l. c. as syn. *H. revolutus* Meyen "Reise i. 311 (1843)." *Viguiera Poeppigii* Gray, Proc. Am. Acad. xix. 6 (1883).

²⁸ The close resemblance of *E. microphylla* to *Flourensia* was commented on by Dr. Gray (Proc. Am. Acad. xix. 7, and Syn. Fl.).

National Herbarium, and the Gray Herbarium. I wish to thank Mr. W. R. Maxon and Dr. C. F. Millspaugh for the loan of the material of *Encelia* under their charge, Mr. M. E. Jones for the loan of 11 sheets of *Enceliopsis* and for assistance in other ways, M. Casimir de Candolle for a photograph of the type of *Simsia lagascaeformis* and critical notes, and Dr. Philip Dowell for aid in proof-reading. I am greatly indebted to Miss Mary A. Day of the Gray Herbarium for assistance in proof-reading and for constant help in bibliographical matters, and above all to Dr. B. L. Robinson for his advice and guidance throughout the whole course of my work.

KEY TO ENCELIA AND SOME RELATED GENERA.

Achenes very flat; no squamellae except in *Helianthella* and *Enceliopsis*.
 Achenes winged; rays usually fertile..... *VERBESINA* L.
 Achenes wingless; rays neutral.
 Squamellae present.
 Usually leafy-stemmed herbs of mountainous regions, with green leaves and frequently foliaceous outer involucral bracts; squamellae mostly narrow, laciniate, and united at base; achenes not villous or white-margined. *HELIANTHELLA* T. & G.
 Scapose desert plants with canescent or silvery broadly oval or rhombic leaves; outer scales never foliaceous; squamellae short and indistinct, mostly united into a low sometimes entire crown; achene villous except in *E. grandiflora*, and strongly white-bordered..... *ENCELIOPSIS* (Gray) A. Nels. (p. 351.)
 No squamellae.
 Scapose, with broad leaves and large solitary heads. (ENCELIOPSIS)
 Leafy-stemmed (except *E. scaposa*, which has linear leaves); heads several (except in two species with linear leaves), small or medium-sized.
 Pales soft, bluntish, falling with the achenes; leaves alternate; achenes villous at least on margins.
 Perennials; style-branches bluntish, not villous; achenes without crown, usually epappose. *ENCELIA* Adans. (p. 358.)
 Annuals or biennials; style-branches longer, villous; achene narrowly cuneate, with strong white margin, awns, and crown..... *GERAEA* T. & G. (p. 355.)
 Pales rigid, acute or acuminate, persistent; lower leaves opposite; style-branches attenuate, hispid-villous; achenes not villous-ciliate..... *SIMSIA* Pers. (p. 376.)
Achenes thickened; squamellae often present.
 Pappus caducous, of paleaceous awns and rarely short squamellae; herbs. *HELIANTHUS* L.
 Pappus more persistent²⁹; awns often aristate, squamellae usually present; herbs or shrubs.
 Squamellae none, or narrow and acute; achenes usually densely villous; alternate-leaved usually glutinous shrubs..... *FLOURENSIA* DC.
 Squamellae present, mostly short, rounded, fimbriate; herbaceous or frutescent, very rarely resiniferous, often opposite-leaved. *VIGUIERA* HBK.

²⁹ Caducous in some Viguieras, e. g. *V. Mandoni* Sch. Bip.

Herbs, with alternate linear leaves and four-angled achenes, or scapose,
with linear-lanceolate leaves (HELIANTHELLA)

ENCELIOPSIS (Gray) A. Nels. (*Encelia*, and $\delta\psi\iota\delta$ likeness).—Heads large, many-flowered, radiate or discoid, the rays neutral; flowers all yellow. Involucre hemispherical, the scales 2-3-seriate, subequal or graduated with the outer shorter, lanceolate to lanceolate, equaling or somewhat exceeding the disk. Receptacle somewhat convex; pales soft and scarious, with abruptly narrowed hairy tip, enfolding the achenes and falling with them. Rays long (1.5-4.5 cm.) and narrow, several-nerved, pubescent on back and tube, entire or tridenticulate, absent in one species; disk-corollas with cylindric tube abruptly widened into the throat, and 5-toothed pubescent limb. Anthers sagittate at base. Style-branches blunish, pubescent. Achenes of ray triquetrous, sterile, rarely maturing and developing thin coryk wings; of disk compressed, very flat, villous particularly on the margins (or glabrate in one species), with blackish body and white cartilaginous border passing above into 2 teeth or awns, these connected by a fringe of short confluent squamellae, sometimes completely united into a thick entire crown.—Scapose xerophytic perennials, with stout root and often much branched caudex, the short branches bearing tufts of thick oval or rhombic 3-5-nerved leaves, and one or several naked or 1-2-bracteate monocephalous scapiform peduncles. Type species *Encelia nudicaulis* Gray.—Four species of very arid regions of the southwestern United States.

Distinguished from *Helianthella* by the generally shorter squamellae, from *Encelia* and *Geraea* by usual presence of squamellae, and from all three by habit. Forming a connecting link between *Geraea* and *Helianthella*, and probably having developed as an adaptation to desert conditions of the mountain loving genus *Helianthella*.

Helianthella § *Enceliopsis* Gray, Proc. Am. Acad. xix. 9 (1883), & Syn. Fl. i. pt. 2. 283 (1884).

Enceliopsis A. Nels. Bot. Gaz. xlvi. 432 (1909).

* Heads discoid; plant hispid-canescens.

1. E. NUTANS (Eastw.) A. Nels. Root tuberiform, becoming very thick (3 cm.) and woody, bearing a short lignescent caudex from which proceed the 1-5 scapes and the tuft of crowded leaves; leaves oval, obtuse to rounded at tip, rounded at base, hispid-canescens with appressed hairs, 2-5 cm. long, on marginated petioles 2-6 cm. long; scapes hispid with somewhat reflexed hairs, 1.5-2.5 dm. high, naked or with one or two narrow bracts; heads nodding in fruit, 2-4 cm. wide, 1.5-2 cm. high; scales densely hispid, lanceolate, 2-3-seriate,

11-15 mm. long, the outer shorter; pales about 15 mm. long, faintly nerved, pubescent on the back and subherbaceous narrow tip; disk-corollas 8 mm. long, tube $\frac{2}{3}$ length of throat; achenes 1 cm. long, obovate, very villous, the callous margin emarginate at apex.

Encelia nutans Eastw. *Zoe* ii. 230 (1891); Jones, *Proc. Calif. Acad. ser. 2. v. 701* (1895).

Enceliopsis nutans A. Nels. *Bot. Gaz.* xlvi. 433 (1909).

Verbesina scaposa Jones, *Zoe* ii. 248 (1891), & *Proc. Calif. Acad. l. c.* (1895).

Specimens examined: COLORADO: Grand Junction, May 1892, *Alice Eastwood* (GN³⁰); UTAH: Green River, alt. 1340 m., 23 May 1895, Jones 11859 (hb. Jones). Type material collected by Miss Eastwood on Orchard Mesa, Grand Junction, 17 May 1891. *Verbesina scaposa* Jones was described from material collected in sandy deserts near Grand River, eastern Utah, at Cisco, 2 May 1890.—This species grows in very poor clay soil containing a little active alkali (sodium carbonate) in open deserts (Jones, in litt.).

* * Heads radiate; plants densely white-pubescent.

← Heads smaller, the rays³¹ 1-2.5 cm. long; pubescence rather dull, not silvery; leaves mostly obtuse or rounded.

2. *E. NUDICAULIS* (Gray) A. Nels. Caudex more or less branched from a thick woody root, the branches short and stout, woolly and covered with the thick crowded bases of former leaves; leaves tufted, ovate to orbicular, subacute to rounded at both ends, white with a dense fine simple pubescence of several-celled glandular-based hairs, 2.5-6.5 cm. long, 1-6.5 cm. wide, on margined petioles one to three times their length; scapes 1.5-2.5 dm. high, pubescent like the leaves, usually bractless; heads 4-8 cm. in diameter including the rays; involucre densely pubescent like the leaves and stem, 3-seried, the scales slightly unequal, subulate-lanceolate from an ovate base, bluntnish, 1-2 cm. long, equaling or barely surpassing the disk; rays about 20, glandular-pubescent on tube and back, tridentate, about 11-nerved, 1-2.5 cm. long, 2-6 mm. wide; disk-corollas 7 mm. long, with short tube and thick-cylindric throat, more or less glandular-pubescent; pales 12-15 mm. long, scarious, pubescent on back and tip and somewhat glandular, often laterally 1-toothed; mature achenes cuneate, 9 mm. long, 3.5 mm. wide, rather shortly silky-

³⁰ In citation of specimens F = Field Museum; G = Gray Herbarium; N = National Herbarium.

³¹ Ligule measurements are taken exclusive of tube.

villous except for a submarginal naked border, narrowly white-margined, awnless or with two stout subulate teeth or slender upwardly pubescent awns $\frac{1}{6}$ — $\frac{1}{3}$ their length, connected by a fimbriate crown of nearly fused squamellae.

Encelia (Geraea) nudicaulis Gray, Proc. Am. Acad. viii. 656 (1873); Jones, Proc. Calif. Acad. ser. 2. v. 701 (1895).

Helianthella nudicaulis Gray, Proc. Am. Acad. xix. 9 (1883).

Enceliopsis nudicaulis A. Nels. I. c. (1909).

Enceliopsis tuta A. Nels. I. c. (1909).

Specimens examined: IDAHO: rather rare, dry rocky bluffs, Salmon River near Bay Horse, 5 Aug. 1895, Henderson 3653 (N); dry sage brush hills, above Salmon River, 6 Aug. 1895, Henderson 3653 (N); NEVADA: Candelaria, Esmeralda Co., 1881, Shockley (G); Hawthorne, Lepantha Mine, alt. 1677 m., 25 May 1897, Jones (N); compact clay slopes, alt. 305 m., Las Vegas, 29 April 1905, Jones 11857 (hb. Jones); limestone clays, Las Vegas, 4 May 1905, Goodding 2271 (G, type collection of *E. tuta*); clay, Horse Spring, alt. 915 m., 17 April 1894, Jones 5069k (hb. Jones); UTAH: St. Thomas or St. George, *Capt. F. M. Bishop* (HOLOTYPE in Gray Herb.); gravel at foot of precipitous slopes in very poor clay soil, Marysville, alt. 1830 m., 4 June 1894, Jones 5376 (hb. Jones); Ferguson Spring, alt. 1920 m., 14 June 1900, Jones 6403 (hb. Jones); halfway station W. of Wa Wa, alt. 2135 m., 15 May 1906, Jones 11856 (hb. Jones).—Inhabits rocky or hard clay knolls where the soil is very compact (Jones, in litt.).

I am unable to separate satisfactorily *E. tuta* from the older *E. nudicaulis*. The type of the latter has medium-sized orbicular leaves, connected by the Shockley and Jones plants with the small subacute ones of *E. tuta*, while the Henderson plants, largest- and broadest-leaved of all, bear some smaller leaves identical in shape and tip with those of *E. tuta*, indicating that the latter represents only a starved phase of *E. nudicaulis*. The achenes appear to be rather variable in pubescence when young, and at maturity are strongly bidentate or with two awns of varying length, the longest that I have seen being about $\frac{1}{6}$ the length of the mature fruit, although when young they are often longer relative to the ovary. The squamellae, fairly distinct when young, become fused into a barely fimbriate crown on the ripe fruit.

— Heads larger, rays 2—4.5 cm. long; pubescence silvery-velutinous; leaves rhombic-ovate, acute.

++ Achenes puberulent or glabrate; rays 3.5—4.2 cm. long, 6—12 mm. wide.

3. *E. GRANDIFLORA* (Jones) A. Nels. “Stems very thick and tufted, branched and very short, woody, densely covered with very

thick leaves;"³² leaves all basal, broadly rhombic-oval or orbicular, subacute, velvety with appressed hairs especially when young, 4.5-8 cm. long, 3-6 cm. wide, on broadly margined petioles of about the same length; scapose peduncles channeled and finely pubescent, 3.5-4.5 dm. high, with 1-2 linear bracts; heads 11-12 cm. in diameter including rays; involucre densely short-pubescent, triseriate, the bracts little graduated, about 18 mm. long, tapering from an ovate base, exceeding the disk; rays 24-33, oblong, subentire or faintly tridentate, 3.5-4.2 cm. long, 6-12 mm. broad, about 11-nerved, pubescent on back chiefly along the veins; disk-corollas with slender tube and cylindric throat, glabrous except for the pubescent teeth, 6-7 mm. long; pales glandular-pubescent at apex, 11-14 mm. long, about 11-nerved; immature achene 6 mm. long, 2.5 mm. wide, appressed puberulent on body and margin or nearly glabrous, with two short ascending awns and a corona of short confluent squamellae; mature achene broadly obovate, 10 mm. long, 6.5 mm. broad, with blackish sparingly puberulent or glabrate body and broad whitish-yellow margin and fimbriatulate crown, the smoothish awns 1 mm. long.

Encelia grandiflora Jones, Proc. Calif. Acad. ser. 2. v. 702 (1895), not *E. grandiflora* (Benth.) Hemsl. (1881).

Enceliopsis grandiflora A. Nels. l. c. (1909).

Helianthella argophylla Coville, Contr. U. S. Nat. Herb. iv. 132 (1893), not Gray.

H. Covillei A. Nels. Bot. Gaz. xxxvii. 273 (1904).

Specimens examined: CALIFORNIA: Panamint Cañon, alt. 610 m., 3 May 1897, Jones 11855 (GN, and hb. Jones); banks of apparently calcareous clay, Hall Cañon, Panamint Mts., alt. 450 m., 18 April 1891, Coville & Funston 698 (G).—This species and the next are found only where sodium chloride is abundant, on cliffs adjoining salt deposits, but apparently never directly on salt flats (Jones, in litt.).

++ ++ Achenes villous; rays 2 cm. long, 4 mm. wide.

4. *E. ARGOPHYLLA* (D. C. Eaton) A. Nels. Base as in the last; leaves in a thick tuft, oblong-obovate or rhombic-obovate, silvery-velutinous, acute at apex, tapering to a broadly margined base, 3-nerved, 3.5-7 cm. long, 1.1-3.2 cm. wide, the petioles shorter; scapose peduncles 1 or 2, 2.5-3.7 dm. high, short-pubescent, bractless; heads 4.5-7.5 cm. in diameter including rays; involucre 2 cm. high, triseriate, the short-silky scales subulate-tipped, with broadly ovate base, exceeding the disk, the outer loose and reflexed; rays about 30,

linear-oblong, 2 cm. long, 3–4.5 mm. wide; disk-corollas 7 mm. long (tube 3 mm.), hairy on teeth and base of tube; pales 13.5 mm. long, laterally 1-toothed, glandular-hairy on keel and tip; achene oblong, 10 mm. long, 3.5 mm. wide, silky-villous on body and margin, awnless or with two subulate awns 1.8 mm. long, the squamellae almost completely united.

Tithonia argophylla D. C. Eaton in Wats. Bot. King's Rep. v. 423 (1871).

Encelia (Geraea) argophylla Gray, Proc. Am. Acad. viii. 657 (1873); Jones, l. c. 702 (1895).

Helianthella argophylla Gray, Proc. Am. Acad. xix. 9 (1883); Co-ville, l. c. (1893), as to name only.

Enceliopsis argophylla A. Nels. l. c. (1909).

Specimens examined: UTAH: St. George, 1870, *Palmer* (fragments of TYPE in Gray Herb.); NEVADA: salty cliffs, salt mine near Stone's Ferry, near the Colorado River, alt. 366 m., 11 April 1894, *Jones* 5032q (hb. Jones).

GERAEA Torr. & Gray ($\gamma\epsilon\rho\alpha\omega\delta$ old, from the canescent-villous achenes). Heads medium-sized or rather large, many-flowered, radiate or discoid, the rays neutral; flowers all yellow. Involucre hemispheric, the scales 2–3-seriate, linear or broadly oblong, equaling or shorter than the disk. Receptacle flattish; pales softly scarious, conduplicate, falling with the achenes. Rays when present cuneate, the tube hairy; disk-corollas with cylindric tube and broader throat, limb hairy and 5-toothed. Style branches long, hairy. Disk-achenes strongly compressed, villous especially on the edges, narrowly cuneate with narrow whitish margin produced into two strong awns decurrent into the conspicuous crown.—Annuals or biennials (base unknown in *G. viscida*), glandular-pubescent, simple or branched, with alternate dentate leaves and usually few paniculate heads. Type species *G. canescens* Torr. & Gray (*Encelia eriocephala* Gray).—Two species of southwestern United States and adjacent Mexico.—The squamellaceous corona of the ovary, from which the thick crown of the fruit is at least in part developed, is distinct enough in *G. viscida*, although visible in *G. canescens* only as a narrow border connecting the decurrent based awns. It seems quite analogous with the corona of completely fused squamellae in such a species of *Enceliopsis* as *E. nutans*.

Geraea Torr. & Gray, Am. Journ. Sci. ser. 2. iii. 275 (Mar. 1847); Proc. Am. Acad. i. 48 (1848).

Simsia section *Geraea* Gray, Pl. Fendl. 85 (1849).

Encelia section *Geraea* Benth. & Hook. fil. Gen. Pl. ii. 378 (1873).

* Heads radiate; involucral scales linear, densely ciliate; lower leaves narrowed to a petiolar base.

1. *G. canescens* Torr. & Gray. Erect annual, 1-6 dm. high, simple or branched from the base, hirsute with white hairs intermixed with stalked glands; leaves lance-oblanceolate, ovate, or obovate, narrowed to a margined base, 1-7 cm. long, 0.3-0.4 cm. wide, acute, 3-nerved, bluntly or acutely toothed mostly above the middle, those of inflorescence bracteiform, all alternate or rarely one or two pairs of opposite ones at base of stem; heads few, somewhat panicled, terminating branchlets or long-peduncled from the upper axils, 5 cm. in diameter when well developed; involucre 8-12 mm. high, 2-3-rowed; the scales subequal or the outer a little shorter, linear-lanceolate, glandular on the back, 3-nerved inside, densely ciliate except at tip with long white hairs; rays 10-14, golden yellow, cuneate, subentire or tridentate, 11-21 mm. long, 6-11 mm. wide, the tube hairy; disk-corollas 6 mm. long, with short glandular-hairy tube and cylindric-funnelform throat; pales 9 mm. long, fimbriate-margined, glandular-hairy toward the narrowed apex; achenes narrowly cuneate, 6-7 mm. long, silky-villous, with flattened denticulate awns half their length, the body black, the narrow white margin continuous with the awns and the thick entire yellowish crown.

Geraea canescens Torr. & Gray, l. c. (1847).

Simsia (Geraea) canescens Gray, Pl. Fendl. l. c. (1849).

Encelia eriocephala Gray, Proc. Am. Acad. viii. 657 (1873).

Specimens examined: UTAH: southeastern part, 1870, *Palmer* (N); NEVADA: El Dorado Cañon, Lincoln Co., Jan.-Apr. 1895, *Lyra Mills* 12 (N); valley of the Virgin River, 6 May 1891, *V. Bailey* (Death Valley Exp. no. 1911: N); CALIFORNIA: Furnace Creek Cañon, Funeral Mts., alt. 100 m., Feb. 1891, *Coville & Funston* 361 (N); 8 miles N. of Salton Sea, Apr. 1910, *Mrs. C. H. Everhart* 2 (F); Palm Springs, alt. 150 m., 19 Apr. 1907, *S. B. Parish* 6079 (F); The Needles, 3 May 1884, *Jones* 3783 (FN); Agua Caliente, Mar. 1881 and Apr. 1882, *Parish Bros.* 228 (FN); Agua Caliente, *W. G. Wright* (G); Colorado Desert, Apr. 1889, *Orcutt* (N); same locality, *Wright* (FN); loose soil, near Calexico, 28 Mar. 1903, *Abrams* 3153 (G); in sandhills, Jan., Ft. Yuma, *Schott* (G); diluvial banks of the Colorado near Ft. Yuma, *Schott* (F); Colorado River, *Newberry* (G); interior of California, *Fremont* 393 of 1844, *Coulter* 304 (COTYPES in Gray Herbarium);

ARIZONA: Ft. Mohave, 1860-1, *Cooper* (GN); Beaver Dam, 1877, *Palmer* 237 (GN); Santa Rosa to Casagrande, 13 Mar.-23 Apr. 1903, *Griffiths* 4008, 4025 (N); Tule Desert, W. of Monument no. 180, 9 Feb. 1894, *Mearns* 2794 (N); without locality, 1880, *Lemmon* (G). SONORA: near El Capitan, southwest of Sonorita, west of Pinacate, 5 Feb. 1910, *Lumholtz* 27 (G).

1 β . *G. CANESCENS* Torr. & Gray var. *paniculata* (Gray) Blake, n. comb. Greener and less hirsute than the ordinary form, paniculately much branched above, the very numerous heads only 2 cm. in diameter including the rays.

Encelia eriocephala var. *paniculata* Gray, Syn. Fl. i. pt. 2. 282 (1884).

Specimens examined: ARIZONA: mesas near Phoenix, 17 June 1882, *Pringle* 1271 (FGN, TYPE COLLECTION).

* * Heads discoid; involucral scales oblong, densely glandular; leaves all sessile by a clasping base.

2. *G. viscida* (Gray) Blake, n. comb. Stout, at least 8 dm. high (the base unknown), hirsutely villous and viscid-glandular throughout; stem channeled, simple or branched above, leafy; leaves thin, oval or broadly ovate-oblong, acutish to obtuse or rounded, sessile by an auriculate or cordate base, irregularly dentate on the wavy margin, the midvein prominent, 3-10 cm. long, 1.5-5 cm. wide; heads rather few, terminating branchlets or long-pedunculate from the upper axils, 1.5-4 cm. broad, hemispherical; involucre shorter than the disk; scales 2-3-seriate, subequal or the outer shorter, oblong, obtuse, 3-nerved, densely glandular, 11-15 mm. long, 2-5 mm. broad; disk-corollas 7-8 mm. long, with rather long slender tube and cylindric throat, somewhat glandular particularly on the tube; pales 14 mm. long, glandular-pubescent toward apex; achenes 7-9 mm. long, with two villous awns more than half their length, narrowly wedge-shaped, silvery-villous, with blackish body and white margin and crown.

Encelia (Geraea) viscida Gray, Proc. Am. Acad. xi. 78 (1876).

Specimens examined: CALIFORNIA: near Larkin's Station, 80 miles east of San Diego, 1875, *Palmer* (TYPE in Gray Herb.); Warner's Ranch, and other elevated places in San Diego Co., June 1880, *Parish* 241 (G); Campo, June 1880, *Vasey* 327 (N); mountains near Campo, 24 July 1883, *Orcutt* (F); dry hills near Campo, 26 May 1903, *Abrams* 3633 (FGN); Potrero Valley, San Diego Co., June 1889, *Orcutt* (N). LOWER CALIFORNIA: without locality, 1883, *Orcutt* (G).

ENCELIA Adans. (to Christopher Encel, who published a work on oak-galls in 1577).—Heads small or medium, radiate or rarely discoid, flowers yellow or purple. Involucral scales 2-3-rowed, subequal or the outer shorter, lanceolate to ovate-lanceolate. Receptacle convex; pales scarious, soft, embracing the achenes and falling with them. Rays entire or 2-3-toothed or -lobed, yellow, rarely absent; disk-corollas with short tube and usually cylindric-funneliform throat, the limb hairy and 5-toothed. Style-branches obtuse, short-pubescent outside. Disk-achenes compressed, very flat, oblong or obovate, villous on margins and glabrous or pubescent on the sides, narrowly white-margined, usually pappusless but in some species with two slender upwardly pubescent awns.—Alternate-leaved generally pubescent perennials, sometimes frutescent, with solitary to paniculate heads of usually yellow flowers. Type species *E. canescens* Lam.—About 14 species of western America, in arid regions and on the sea-coast, from Nevada to Lower California and central Mexico, and again from Peru to central Chili; one species on the Galapagos Islands.

Encelia Adans. Fam. ii. 128 (1763).

Pallasia L'Hér. ["Diss. (1784)"] in Ait. Hort. Kew. iii. 498 (1789), not of Houtt. 1775, nor Scop. 1777, nor L. fil. 1781, nor Klotzsch 1853 (the last a valid genus of *Rubiaceae*, the others all synonyms of various genera).

Eucalia Raeuschel, Nom. ed. 3. 251, 385 (1797), a nomen nudum.

Enchelya Lem. in Orb. Dict. Hist. nat. v. 300 (1844).

Encelya and *Enchelia* Baillon, Dict. Bot. ii. 517 (1886).

KEY TO THE SPECIES OF ENCELIA.

- A. Suffrutescent, leaves laciniately lobed.
 - B. Leaves linear..... 1. *E. ventorum*.
 - B. Leaves ovate..... 2. *E. laciniata*.
- A. Leaves linear, unlobed.
 - B. Heads panicled; plant resinous..... 14. *E. stenophylla*.
 - B. Heads solitary; leafy-stemmed; leaves glabrous beneath.
 - 12. *E. angustifolia*.
 - B. Heads solitary; scapose; leaves puberulent both sides.
 - 13. *E. scaposa*.
 - A. Leaves oblong to ovate, unlobed.
 - B. Heads paniculate, numerous; branches of inflorescence glabrous.
 - 3. *E. farinosa*.
 - B. Heads few or solitary; peduncles pubescent.
 - C. Leaves cordate..... 11. *E. Palmeri*.
 - C. Leaves rounded or cuneate at base.
 - D. Shrubby; disk yellow.
 - 4. *E. frutescens*.
 - 5. *E. albescens*.

- D. Mostly herbaceous; disk purple.
- E. Leaves tomentose or canescent with a rather soft pubescence;
 - South American..... 9. *E. canescens*.
 - E. Hispid-canescens; plant of the Galapagos Islands.
 - 10. *E. hispida*.
- E. Leaves greener, less pubescent; Mexican and Californian.
 - F. Involure densely tomentose, or seabrous-pubescent in a
 - variety..... 8. *E. californica*.
 - F. Scales dorsally glandular, ciliate toward tip; leaves
 - ovate, acute..... 7. *E. halimifolia*.
 - F. Scales glandular-ciliate; leaves oval-oblong, obtuse.
 - 6. *E. conspersa*.

SYNOPSIS OF SPECIES.

* **LACINIATAE.** Suffrutescent, with laciniate lobed leaves; achene pap-pusless; disk purple.

← Leaves linear; peduncles a centimeter long.

1. **E. VENTORUM** Brandegee. Suffrutescent, much branched, 0.9–1.2 m. high, stem 5–7.5 cm. thick; the young branchlets glandular; leaves crowded toward tips of branches, fleshy, linear, with 1–5 linear alternate lobes above the middle, 3–6.5 cm. long, 1–2 mm. wide; heads "fragrant," glutinous, nodding on short peduncles, solitary at tips of branches, hemispheric, 10–12 mm. high; scales about 3-seriate, somewhat unequal, rather loose, lanceolate to lance-ovate, ciliate and glandular-dotted, becoming reflexed and somewhat woody in age; rays about 10, small, 8 mm. long, truncate, with rather long hairy tube; disk-flowers about 50, the corolla 5 mm. long, with short tube and cylindric-funneliform throat; pales greenish and glandular-puberulent on the keel, about 3-nerved on the sides, 7–11 mm. long; achenes 5.5–8 mm. long, oblong, truncate, narrowly margined, with villous margin and apex glabrous on the sides.

Encelia ventorum Brandeg. Proc. Calif. Acad. ser. 2. ii. 175 (1889).

Specimens examined: LOWER CALIFORNIA: Lagoon Head, 6–15 Mar. 1889, Palmer 828 (GN); Playa Maria, July–Oct. 1896, Anthony 118 (FGN). Originally collected by Brandegee "on the narrow strip of sand between the lagoons and the ocean near the Boca de Las Animas."

← ← Leaves broader; peduncles 2.5–6.5 cm. long.

2. **E. LACINIATA** Vasey & Rose. Suffrutescent, 0.6–0.9 m. high, much branched, more or less glandular-pubescent, and usually hispid with ascending hairs on the younger parts; leaves ovate or obovate in outline, acute or obtuse, unequally and laciniate lobed with the lobes sometimes toothed, narrowed to a margined petiole, 3–5.5 cm. long, 1–2.5 cm. wide, lamina 2.5–6 mm. broad between the lobes; heads

terminal and long-peduncled from the upper axils, nodding in fruit, 10-12 mm. high; scales 2-3-rowed, loose, lanceolate, somewhat glandular, ciliate and tomentose; rays about 12, oval, subentire, 7 mm. long, with hairy tube; disk-corollas as in the last, glandular at base and tip, 5 mm. long; pales few-nerved, glandular-hairy toward the loose subherbaceous tip, 8-10 mm. long; achenes 5-6.5 mm. long, obovate, emarginate at apex, densely spreading-villous on the margin and with a few hairs toward the apex.

Encelia laciniata Vasey & Rose, Proc. U. S. Nat. Mus. xi. 535 (1889).

Specimens examined: LOWER CALIFORNIA: sand plains and hills above the bay, Lagoon Head, 6-15 Mar. 1889, Palmer 804 (FGN, TYPE COLLECTION); Ascension Island, Mar.-June 1897, Anthony 435 (G). Also reported by Brandegee from San Gregorio.—Anthony's plant differs from Palmer's in its thicker more bluntly lobed leaves, like the stem finely glandular-pubescent, nearly without the rough white hairs of the types.

* * HALIMIFOLIAE. Herbaceous or frutescent; leaves entire or merely repand-toothed, oblong to ovate; disk yellow or purple; achene rarely with 1 or 2 weak awns.

← Heads numerous, paniculate, the branches of inflorescence smooth; leaves chiefly basal.

3. E. FARINOSA Gray. Much branched from a woody base, sometimes 1.6 m. high, the stems and branches exuding a fragrant resin, white-mealy becoming glabrate; leaves mostly basal, broadly ovate to lanceolate, acute or obtuse, entire or rarely repand-toothed, the margin often undulate, densely white-farinose occasionally becoming subglabrate, the nerves rather prominent beneath, 3-10 cm. long, 2-5 cm. wide, on narrowly margined petioles 1-4 cm. long; panicle nearly naked, the branches whitish-yellow, glabrous or rarely with a few hairs, often glandular-hairy just below the heads; heads terminating the branches, often nodding in fruit, radiate, disk 1-1.5 cm. in diameter; scales imbricated in 3-4 rows, the outer or sometimes all linear, the inner usually successively longer and with broader bases, loosely hairy when young, often glabrate when older, all blunt, the longest 3.5-7 mm. long, shorter than the disk; rays ³³ about 12, usually conspicuous, 7-11 mm. long, oval-oblong, 3-lobed; disk-corollas 3.5-4.5 mm. long, glandular on the tube, yellow including the limb; pales 6-7 mm. long, glandular on keel, faintly nerved, entire or laterally 1-toothed; achene 4.5 mm. long, obovate, emarginate, villous all over except for a submarginal naked border, awnless.

³³ In *Coulter* 327 (hb. Gray) some at least of the rays are styliferous, the only such instance known to me in the genus.

Encelia farinosa Gray in Torr. Bot. Emory Rep. Mil. Recon. 143 (1848).

Specimens examined: NEVADA: Muddy Valley, Lincoln Co., alt. 518 m., 1 May 1906, *Kennedy & Goodding* 8 (N); boulder washes, Las Vegas Mts., 13 May 1905, *Goodding* 2363 (G); CALIFORNIA: Panamint Cañon, alt. 610 m., 3 May 1897, *Jones* (N); Furnace Creek Ranch, Death Valley, 25 Mar. 1891, *Corville & Funston* 476 (FGN); near Bennett Wells, Death Valley, 22 Jan. 1891, *Corville & Funston* 202 (N); Los Angeles, 25 May 1902, *Braunton* 287 (N);³⁴ San Bernardino Mts., 1880, *Vasey* 286 (N); San Bernardino, 12 Jan. 1880, *S. B. Parish* (G); May 1881, *Parish* (F); 2 May 1896, *C. E. Cummings* (G); dry hills near San Bernardino, 27 Apr. 1891, *S. B. Parish* 2192 (N); vicinity of San Bernardino, alt. 305–457 m., 27 Apr. 1895, *S. B. Parish* 3638 (GN); foothills near San Bernardino, 15 May 1891, *S. B. Parish* (F); San Bernardino Hills, Apr. 1881, *Parish* (F); near Barstow, 12 Apr. 1905, *T. E. Wilcox* (N); The Needles, 8 May 1884, *Jones* 3853 (FN); Elsinore, 4 Apr. 1903, *Baker* 4151 (FG); Temecula Cañon, alt. 800 m., 31 Mar. 1898, *Leiberg* 3209 (N); Box Springs, San Diego Co., 10 May 1882, *Orcutt* (F); Signal Mt., Colorado Desert, 2 Apr. 1903, *Abrams* 3159 (G); Colorado Desert, Mar. 1881, *W. G. Wright* 183 (G); southeastern California, 1876, *Palmer* (G); southern California, 1876, *Parry & Lemmon* 181 (F); California, *Coulter* 327 (G); Colorado River, interior of California, 1854, *Bigelow* (G); Mexican Boundary Survey under Emory, 1846 (TYPE in Nat. Herb., no. 46083); eastern base of Coast Range, edge of Colorado Desert, 7 May 1894, *Mearns* 2969 (N); ARIZONA: Fort Mohave, 1860–1, *Cooper* (G); Beaver Dam, 1877, *Palmer* 239 (G); Grand Cañon of the Colorado, Journey of 1885, *Gray* (G); Verde Mesa, 1867, *E. Smart* 201 (N); buttes, Tempe, 19 Apr. 1892, *Ganong & Blaschka* (G); along the Gila, Mar. 1852, *Parry* 54 (G); Coyote to Santa Rosa, 13 Mar.–23 Apr. 1903, *Griffiths* 3986 (N); Laosa to Lavare via Babuquivari, 1903, *Griffiths* 3615 (N); Santa Catalina Mts., 19 Apr. 1881, *Pringle* (FG); Camp Grant, 2 Apr. 1867, *Palmer* 124 (G); Tucson Mts., Sept. 1907, *Thornber* (N); Tucson Mts., 1903, *Griffiths* 3475 (N); hills near Tucson, 8 May 1883, *Pringle* (F); Tucson, 8 Apr. 1892, *Toumey* (N), and 1 May 1892, *Toumey* 687 (N); Tule Mts., Mexican boundary line, 11 Feb. 1894, *Mearns* 2800 (N); near Monument no. 178, Mex. bound. line, 8 Feb. 1894, *Mearns* 2791 (N); Chimehuevis, alt. 915 m., 21 Apr.

³⁴ A MS. note attached to the sheet says in part: "This plant was just 10 ft. from root to fruit." The species is not included in Abrams' Los Angeles Flora.

1903, *Jones* (N). SONORA: common on plains from Huerigo to Granada, Guasabas, alt. 915-1220 m., 15 Nov. 1890, *Hartman* 233 (GN); Hermosillo, 10 June 1897, *F. S. Maltby* 229 (N); Torres, 10 June 1897, *Maltby* 179 (N); El Grupo (?), 13 Nov. 1895, *McGee* (N); hillsides, Guaymas, July 1887, *Palmer* 111 part (GN); Hermasillo, 4 Mar. 1910, *Rose, Standley, & Russell* 12354 (N); Empalme, 11 Mar. 1910, *Rose, Standley, & Russell* 12625 (N); Carral, 12 Mar. 1910, *Rose, Standley, & Russell* 12651 (N); Guaymas, 23 Apr. 1910, *Rose, Standley, & Russell* 15051 (N); Magdalena, 25 Apr. 1910, *Rose, Standley, & Russell* 15098 (N); SINALOA: thickets along Rio Fuerte, San Blas, 24 Mar. 1910, *Rose, Standley, & Russell* 13365 (N).—The only *Encelia* of any economic importance, and that but slight, the resin being burned as incense in the churches of Lower California, giving the plant the local name of "Incienso" (Brandegee, *Zoe* i. 83 (1890)).

3β. *E. FARINOSA* Gray f. *phenicodonta* Blake, n. forma, disco purpureo. Disk-corollas purple above; otherwise as in the typical form.—Specimens examined: CALIFORNIA: Riverside Mt., *Newberry* (G); ARIZONA: Williams Fork, Mar. 1876, *Palmer* 251 (FN). LOWER CALIFORNIA: west side of Lake Maquata, Colorado Desert, 27 Jan. 1890, *Orcutt* 2023 (N); cañon near San Quentin, 22 Apr. 1886, *Orcutt* 1341 (COTYPES in FGN); old diggings, Calmalli, alt. 366 m., Jan.-Mar. 1898, *Purpus* 33 (FN); La Paz, 20 Jan.-5 Feb. 1890, *Palmer* 50 (N); Santa Rosalia, 24 Feb.-3 Mar. 1889, *Palmer* 186 (GN); SONORA: Papago Tanks, Pinacate Mts., 14 Nov. 1907, *MacDougal* (N); hillsides, Guaymas, July 1887, *Palmer* 111 in part (GN).

3γ. *E. FARINOSA* Gray var. *radians* Brandeg. in herb., n. comb.—Leaves glabrate or nearly so; involucre nearly or quite glabrous, its bracts chiefly linear-oblong; disk purple.

Encelia radians Brandeg. Proc. Calif. Acad. ser. 2. ii. 176 (1889).

Specimens examined: LOWER CALIFORNIA: San José del Cabo, Mar.-June 1897, *Anthony* 433 (GN); same locality, Jan.-Mar. 1901, *Purpus* 398 (GN).

— — Heads few or solitary; peduncles usually pubescent; stem leafy.
↔ Shrubby, even the branches woody; heads solitary at tips of long naked usually scabrous peduncles terminating the branches, often discoid; disk yellow; awns often present.

4. *E. FRUTESCENS* Gray.³⁵ A low much branched shrub, 1.3-1.6 m. high, white with a dense short very scabrous pubescence at least

³⁵ Often confused with *Viguiera Parishii* Greene, which is rather similar in aspect but has mostly opposite cordate-deltoid leaves and a pappus of squamellae as well as awns.

on the younger parts, the branchlets ending in long naked monocephalous peduncles; leaves short-petioled, oblong to ovate, obtuse or acute, cuneate or truncate at base, scabrous with scattered white hairs with persistent tuberculate bases, 1-3 cm. long, 0.6-1.6 cm. wide; involucre 6-10 mm. high, its scales somewhat unequal, 3-rowed, hispid-scabrous and sometimes slightly glandular, varying from linear-lanceolate to ovate-acuminate; heads 1-2.5 cm. broad; rays rarely present, then about 12, 3-lobed, about 9 mm. long; disk-corollas 5-6 mm. long, with glandular-hairy tube and hairy limb; pales glandular-pubescent, 1 cm. long; achenes black with narrow white margin, villous on the edges and somewhat pubescent on the sides, 6.5-8 mm. long, 2.5-3.2 mm. broad, awnless or with 1 or 2 weak villous awns.

Simsia frutescens Gray in Torr. Bot. Mex. Bound. 89 (1859).

Encelia frutescens Gray, Proc. Am. Acad. viii. 657 (1873).

E. frutescens f. *radiata* Hall, Univ. Calif. Pub. Bot. iii. 135 (1907).

E. frutescens f. *ovata* Hall, l. c.

Specimens examined: CALIFORNIA: Mohave Desert, near Bagdad, 12 Apr. 1905, *Wilcox* (N); The Needles, 3 May 1884, *Jones* 3812 (FN); near Cañon Springs, Apr. 1905, *Hall* 5859 (N); Palm Spring, alt. 61 m., 10 May 1903, *Jones* (N); wash near Coyote Wells, Colorado Desert, 3 Nov. 1890, *Oreutt* 2200 (GN); Signal Mt., 2 Apr. 1903, *Abrams* 3156 (FGN, cotype number of *f. ovata* Hall); interior of California, 1849, *Fremont* (G, COTYPE); ARIZONA: ravines in gravel plain, Ft. Mohave, 1860-1, *Cooper*, (GN, mixed with *Viguiera Parishii* Greene); Sierra Prieta near Ft. Yuma, *Schott* (G, COTYPE); Agua Caliente, 1846, *Emory* (G, COTYPE); Yuma, 1881, *Vasey* (N); west bank of Colorado River below Yuma, 7 Apr. 1894, *Mearns* 2853 (N); Yuma, 25 Apr. 1906, *Jones* (N); Santa Catalina Mts., Apr. 1881, *Lemmon* 188 (G); Red Rock, 11 June 1892, *Toumey* 671 (N); Carrizo Creek, *Hayes* 446 (G); mesas near Tucson, 8 May 1884, *Pringle* (FGN, cotype number of *f. ovata* Hall); mesas, without exact locality, 15 May 1881, *Pringle* (FG); foothills, Santa Rita Mts., 1902, *Griffiths & Thornber* (N); high plains, Lowell, 9 May 1884, *W. F. Parish* 110 (G); Wilmot Siding, 8 miles southeast of Tucson, on the mesas, 800 m., 6 June 1903, *Thornber* 83 (N); without locality, 1869, *Palmer* (N).

The form *ovata* described by Hall seems hardly distinct enough for recognition; apparently the lower leaves are always more or less ovate or ovate-oblong, the upper usually oblong but sometimes broader, but without any distinct line of demarcation; and the presence of rays, also, is a character scarcely requiring recognition by name.

The following sheets, with ovate leaves more or less glandular and with fine appressed pubescence, seem intermediate between this and var. *virginensis*: ARIZONA: near Ft. Verde, 20 June 1883, *Rusby*, (FN); along Bright Angel Trail to Grand Cañon, alt. 1000 m., 10 Sept. 1901, *Leiberg* 5926 (N); Hackberry, 24 May 1884, *Jones* (FN).

4β. *E. FRUTESCENS* Gray var. *resinosa* Jones in litt., n. var., *hispido-scabra* et plus minusve glandulosa interdum glandulosissima; foliis tenuibus margine sinuatis late ovatis 1-2 cm. longis latisque subacutis obtusisve basi truncatis vel rotundatis rare cuneatis utrinque plus minusve glandulosis scabris pilis albis basi tuberculatis; petiolis glanduloso-scabris 5-7 mm. longis; pedunculis 1-2 dm. longis glandulosis sparse scabris; capitulis 1-2 cm. diametro radiatis; involueri 2-3-seriatis squamis ovato-acuminatis vel linearis-lanceolatis dense glandulosis exterioribus interdum paucis pilis hispidis; paleis dense glandulosis; achenis exaristatis.

Specimens examined: UTAH: near Great Salt Lake, *Capt. Bishop* (G); ARIZONA: without locality, 1869, *Palmer* (N); Little Colorado near Winslow, 10 June 1890, *Jones* (TYPE COLLECTION, GN); half mile below Tanner's Crossing, Little Colorado, 18 May 1901, *L. F. Ward* (N).

4γ. *E. FRUTESCENS* Gray var. *virginensis* (A. Nels.) Blake, n. comb. Leaves broadly ovate, cinereous-scabrous with a fine glandular pubescence intermixed with stouter tuberculate-based hairs like those found in the type; outer involucral scales linear-lanceolate, the inner ovate-acuminate; rays apparently always present; otherwise as in the typical form.³⁶

Encelia virginensis A. Nels. Bot. Gaz. xxxvii. 272 (1904).

E. frutescens f. *virginensis* Hall, l. c. (1907).

Specimens examined: UTAH: valley of the Virgin River near St. George, 1874, *Parry* 142 (FG); La Verken, alt. 1036 m., May 1894, *Jones* 5195 (FN); southern part, 1875, *Johnson* (N); NEVADA: "The Pockets," valley of the Virgin River, 30 April 1902, *Goodding* 666 (FGN, COTYPES of *E. virginensis*); dry washes, Mesquite Well, 1 May 1905, *Goodding* 2259 (G); ARIZONA: northern part, 1872, *Wm. Thompson* 380 (N).

The following, with white-pubescent but scabrous leaves and more or less ovate-acuminate outer scales, seem intermediate between this variety and the next; UTAH: St. George, 1877, *Palmer* 238 (G);

³⁶ According to Nelson's description the lower leaves are opposite, but I have been unable to find evidence of this in the material at hand, and opposite leaves are unknown elsewhere in the genus.

NEVADA: Moapa, Lincoln Co., alt. 518 m., 12 May 1906, *Kennedy* 1112 (N); ARIZONA: 1869, *Palmer* part (N).

4δ. *E. FRUTESCENS* Gray var. *actoni* (Elmer) Blake, n. comb. Leaves ovate, cuneate or truncate at base, very rarely toothed, whitened with a rather soft fine pubescence; pubescence of stem and peduncles also softer than in the typical form; involucral scales mostly ovate-acuminate; rays apparently always present; otherwise as in the typical form.

Encelia actoni Elmer, Bot. Gaz. xxxix. 47 (1905).

E. frutescens f. *actoni* Hall, l. c. (1907).

Specimens examined: NEVADA: Esmeralda Co., 31 May 1886, *Shockley* 416 (G); Candelaria, alt. 1677 m., June 1887, *Shockley* 540 (G); without locality, 1872, *Lt. Wheeler* (N); alt. 1050 m., Beattie, Nye Co., 5 June 1912, *Heller* 10422 (N); CALIFORNIA: Pleasant Cañon, Panamint Mts., alt. 1677 m., 6 May 1897, *Jones* (N); near Independence, 29 May 1906, alt. 1160 m., *Hall & Chandler* 7217 (G); hillsides, Argus Mts., alt. 1220–1525 m., 1897, *Purpus* 5383 (GN); Tehachapi foothills, Kern Co., 30 May 1905, *F. Grinnell* (N); east slope of Walker Pass, Kern Co., alt. 1300 m., 21 June 1891, *Coville & Funston* 1020 (N); Rock Creek, desert slopes of San Gabriel Mts., alt. 1158 m., July 1908, *Abrams & McGregor* 548 (N); Liebre Mts., June 1908, *Abrams & McGregor* 402 (GN); Acton, June 1902, *Elmer* 3724 (N, TYPE NUMBER of *E. actoni*³⁷); Mohave Desert, June 1887, *S. B. Parish* (F); near Hesperia, Mohave Desert, 30 May 1901, *S. B. Parish* 4873 (N); San Francisquito Creek, 27 May 1905, *F. Grinnell* (N); San Francisquito Cañon, 26 May 1905 (N); Victor, alt. 792 m., 17 May 1903, *Jones* (N); San Jacinto, June 1901, *Hall* 2007 (N); San Felipe Cañon, 22 June 1888, *Orcutt* 1483 (N); San Jacinto, 14 Aug. 1907, *V. Bailey* (N); San Felipe, June 1852, *Thurber* 634 (G); San Isabel, June 1852, *Thurber* 634 (G); near San Felipe, 10 Oct. 1858, *Sutton Hayes* 443 (N); dry rocky hills, Jacumba, 31 May 1903, *Abrams* 3667 (GN); Smith's Mt., San Diego Co., 1880, *Vasey* 285 (FN); ARIZONA: Colorado River, *Schott* (G)³⁸; "Jesup Rapids," 18 Feb. 1858, *Ives Expedition*, in part (N).

5. *E. ALBESCENS* Gray. Frutescent (?); branches striate, whitened with a roughish appressed pubescence, terminating in naked

³⁷ Described by Elmer as having the ray-flowers styliferous, but I do not find them so.

³⁸ Originally taken by Gray (Bot. Mex. Bound. 88) to be *E. conspersa* Benth. and afterwards considered (Proc. Am. Acad. viii. 656) a small variety of *E. californica*, but best placed here.

similarly pubescent monocephalous peduncles; rameal leaves ovate, obtusish, barely toothed, whitened with an appressed scabrous pubescence particularly beneath, 2-2.5 cm. long, 0.9-1.2 cm. wide, short-petioled; involucre 7 mm. high, the scales subequal, in 2 rows, linear-lanceolate, appressed-pubescent and scabrous without; rays suborbicular, 3-lobed, 12 mm. long, pubescent on the back; disk-corollas 5 mm. long, pubescent on tube and teeth; pales 7 mm. long, scantily glandular-pubescent on back, fimbriate at apex; immature achene 4.7 mm. long, villous on margin, appressed-pubescent on the sides, bearing 2 unequal weak awns, or awnless.

Encelia albescens Gray, Proc. Am. Acad. viii. 658 (1873).

Specimens examined: SONORA: 1869, Palmer 21 (GN, COTYPES).—A doubtful species, known from very insufficient specimens, too close to *E. frutescens* var. *actoni*.

++ ++ Mostly herbaceous (except no. 6); heads always radiate, usually somewhat racemose; disk purple; awns absent (rarely present in one variety).

= Frutescent; leaves small, oblong, green; involucral scales glandular-ciliate.

6. *E. CONSPERSA* Benth. Shrubby, branched, the scabrous bark white; branches leafy below, terminating in nearly naked 1-3-branched peduncles, the branches monocephalous; leaves oblong to ovate, obtusish, cuneate or truncate at base, green, scabrous-pubescent especially beneath, 2-2.5 cm. long, 8-10 mm. wide, on petioles 3.5-7 mm. long; peduncles slightly scabrous; disk 1-1.3 cm. in. diameter, 8 mm. high; involucre 5-6 mm. high, its scales unequal, 3-seriate, the outer lanceolate, the inner ovate, glandular on back and white-ciliate nearly to the tip; rays oval, slightly 3-lobed, pubescent on tube and back; disk-corollas 5 mm. long, with short tube, glabrous; pales 6 mm. long, about 9-nerved, glandular on the back; immature achenes 2.5 mm. long, villous on the margin, pubescent on the sides.

Encelia conspersa Benth. Bot. Voy. Sulph. 26 (1844).

Specimens examined: LOWER CALIFORNIA: Magdalena Island, 18 Jan. 1889, Brandegee (GN).—Bentham's type came from Bay of Magdalena.—Brandegee's specimens well agree with Bentham's description, except that the branches are not "albo-tomentosis" nor the scales "lineari-lanceolatis." The species must remain somewhat in doubt until Bentham's type can be re-examined. As is suggested in Index Kewensis, it seems in the specimens at hand too close to *E. halimifolia* Cav.

= = More herbaceous; leaves larger, generally canescent or white-tomentose; involucral scales generally tomentose or canescent-pubescent.

× Leaves green; scales mostly ciliate.

7. *E. HALIMIFOLIA* Cav. Suffrutescent, branched, apparently diffuse, the stems, young branches, and in a less degree the peduncles canescent with fine incurved hairs; leaves ovate, acute or obtusish, cuneate or nearly truncate at base, entire or slightly repand-toothed, somewhat pubescent with incurved hairs but not canescent, 2.5–3.5 cm. long, 1.2–2 cm. wide, on petioles a centimeter long; peduncles axillary and terminal, simple or 2–3-branched, monocephalous, nearly naked; heads 8 mm. high, 1.2–1.4 cm. wide excluding rays; involucre 5–6 mm. high, the scales somewhat unequal, 2–3-seriate, linear-lanceolate, glandular-ciliate; rays 10–12, broadly oval, barely 3-lobed, pubescent on tube and back; disk-corollas 4.5 mm. long, with short tube, glabrous; pales 7.5 mm. long, glandular-pubescent on back; immature achene 3.6 mm. long, villous on margin, otherwise nearly glabrous.

Encelia halimifolia Cav. Icon. iii. 6. t. 210 ("1794" = 1795).

Pallasia grandiflora Willd. Sp. Pl. iii. 2261 (1804).

Specimens examined: SONORA: Yaqui River, 1869, *Palmer* 12 (FGN). There is also a sheet in Gray Herb. (ex herb. Klatt) labeled "Ex horto Scholae centralis Monspeliensis. Mexico? Peruvia!" but the specimen is doubtless from Mexico.

× × Leaves canescent or tomentose, or involucre densely pubescent.

◦ Leaves green; involucre usually densely and softly tomentose; plants of California and Lower California.

8. *E. CALIFORNICA* Nutt. Much branched, somewhat spreading from a frutescent base, 6–10 dm. high, or on San Clemente Island becoming 3–3.6 m. high, 2.5–10 cm. in diameter; stem and peduncles canescent with fine incurved-spreading rather soft hairs; leaves from lanceolate to ovate, acute, cuneate or rarely slightly rounded at base, entire or somewhat repand-dentate, appressed-pubescent with soft hairs but distinctly green, 3–6 cm. long, 1–3 cm. wide, on petioles 0.5–3 cm. long; peduncles long, terminal and axillary toward ends of branches, nearly naked; disk 1.5–2.5 cm. in diameter; involucre 1–1.3 cm. high, the scales 2–3-seriate, lanceolate, densely tomentose; rays oblong, 14–20, pubescent on tube and exterior, 1.5–3 cm. long; disk-corollas 5 mm. long, glabrous or the teeth pubescent; pales 7.5–10 mm. long, glandular-puberulent above; achenes 5.5–6 mm. long, villous on margin and pubescent down the middle of each side, awnless.

Encelia californica Nutt. Trans. Am. Philos. Soc. ser. 2. vii. 357 (1841).

Specimens examined: CALIFORNIA: Santa Barbara, 1873, *Bolander* (G); also June 1875, *Rothrock* 82 (F), and May 1902, *Elmer* 3899 (FN); ocean bluffs, Santa Barbara, 16 May 1908, *Eastwood* 129 (FGN); near the 35th parallel, Whipple's Exp., 1853-4, *Bigelow* (N); San Fernando Valley, Feb. 1861, *Brewer* 187 ("bad smell", GN); beach above San Buenaventura, 5 Mar. 1866, *S. F. Peckham* (N); Pasadena, May 1903, *Grant* 395 (F); Santa Monica, Oct. 1881, *Parish Bros.* 964 (F); also 24 Jan. 1897, *J. H. Barber* 29 (N); near beach, Long Wharf, near Santa Monica, 13 Aug. 1910, *Blake* 693 (G); hillsides, May 1885, Los Angeles, *Hasse* (N); foothills, Griffith Park, 13 Mar. 1902, *Braunton* 242 (N); hillsides near Inglewood, 8 Mar. 1903, *Abrams* 3107 (G); Redondo, 25 May 1902, *Braunton* 288 (N); hills, Wilmington, 1 Apr. 1882, *Pringle* (FN); near Riverside, alt. 366 m., Apr. 1902, *Hall* 2922 (N); San Diego, *Parry*, *Newberry*, *Nuttall* (G); also 1875, *Palmer* 169 (F), 28 Feb. 1884, *Orcutt* (F), 15 Mar. 1882, *Jones* 3069 (N), 29 Jan. 1894, *H. A. Sheldon* 45 (N), 30 Mar. 1896, *C. E. Cummings* (G), 1 May 1902, *Brandegee* (Baker distr. 1657, FGN), May 1906, *Brandegee* (F); La Jolla, 16 Feb. 1895, *Snyder* (F); seashore, 30 m. from Lower California, 24 Feb. 1883, *G. C. Deane* (G); Catalina Island, 30 Jan. 1874, *Baker & Dall* (GN); Avalon, May 1898, *Trask* (N); San Clemente Island, 25 Aug. 1894, *Mearns* 4067 (N); Chalk Cañon, San Clemente Island, June 1903, *Trask* 204 ("10-12 ft. tall; 1-4 ins. diam.", N); ARIZONA: Ft. Mohave, 1860-1, *Cooper* 324 (N). LOWER CALIFORNIA: Todos Santos, 13 May 1882, *H. E. Fish* (F); San Quentin Bay, Jan. 1889, *Palmer* 661 (N), 662 (GN).—Bailey (Cyc. Am. Hort. ii. 529 (1900)) states that this species is in cultivation.

88. *E. CALIFORNICA* Nutt. var. *asperifolia* Blake, n. var., frutescentior capitulis foliisque plerumque minoribus; disco 1.2-1.8 cm. diametro; pube caulinum foliorumque asperiore; folii ovalibus vel ovatis 1.5-3 cm. longis 1-1.5 cm. latis scabris subintegris; involucre breviore, pube densa aspera, squamis subglandulosis ad apicem subglabratibus; acheniis rare cum aristis 1-2 tenuibus.

Specimens examined: LOWER CALIFORNIA: near Rosario and San Fernando, 4 May 1886, *Orcutt* 1346 (FGN); Lagoon Head, 40 miles inland, 6-15 Mar. 1889, *Palmer* 822 (GN); Cedros Island, 1875, *Streets* (GN), also 18-20 Mar. 1889, *Palmer* 702 (FGN: 1 or 2 weak awns present), Mar.-June 1897, *Anthony* 292 (COTYPES in FGN); San Benito Island, *Streets* (G); San Bartolome Bay, Mar. 1889, *Lt.*

C. F. Pond (N).—Often confused with *E. frutescens* Gray, from which the purple disk at once distinguishes it.

- ○ Leaves canescent or tomentose; involucre not densely tomentose; plants of South America (except one species of Lower California, with cordate leaves).
- + Leaves cuneate or rounded at base; plants of South America and the Galapagos Islands.
- Pubescence usually soft; heads (except in starved specimens) long-peduncled; South American.

9. *E. CANESCENS* Lam. Suffrutescent below, suberect, canescent with a rather soft pubescence, the stem about 6 dm. long; leaves broadly ovate, rounded at base, obtuse or rounded at tip, canescent with a soft pubescence, 2.5–5 cm. long, 1.6–3.5 cm. broad, on petioles 0.5–2 cm. long; inflorescence few-headed, terminal, the heads racemose or corymbose-panicked; disk 1–1.5 cm. in diameter; involucre 5–7 mm. high, its rather loose bracts lanceolate to lance-ovate, somewhat tri-seriate, tomentose; rays about 12, broadly oval, faintly 2–3-lobed, 7 mm. long; disk-corollas 4.5 mm. long, the short tube glandular, the teeth hairy; pales 8 mm. long, glandular-hairy on the back; achenes 6 mm. long, 2.7 mm. wide, blackish with narrow white villous margin, pilose down the middle of the sides, awnless.

Encelia canescens Lam. Encycl. Method. ii. 356 (1786); Cav. Icon. i. 45. t. 61 (1791).

Coreopsis limensis Jacq. Coll. ii. 299 (1788), & Icon. Pl. Rar. iii. t. 594 (1786–1793).

Enselia limensis Jacq. Coll. l. c. 300; *Encelia limensis* Steud. Nom. ed. 2. 420 (1840).

Pallasia halimifolia L'Hér. in Ait. Hort. Kew. iii. 498 (1789).

Encelia alternifolia Raeuschel, Nom. ed. 3. 251 (1797).

Eucalia canescens Raeusch. l. c. (1797).

Specimens examined: PERU: dry seacoast, Payta, *Col. Hall* (G); Lima and San Lorenzo, *Gaudichaud* 112 (G); without definite locality, *Dombey* (G), *McLean* (G); *Wilkes Expl. Exp.* (N), approaching var. *oblongifolia*; CHILI: sandy places, Copiapo, Sept. 1854, *Lechler* 2801 (G).—Passes into the following varieties.

9β. *E. CANESCENS* Lam. var. *PARVIFOLIA* (HBK.) J. Ball. Pubescence denser, almost tomentose; leaves rhombic-ovate or ovate-lanceolate, cuneate at base, acute or subacute at tip; achenes rather more hairy.

Encelia parvifolia HBK. Nov. Gen. iv. 206 (1820).

Encelia canescens var. *parvifolia* J. Ball, Journ. Linn. Soc. xxii. 151 (1887).

Pallasia procumbens Spreng. Sys. iii. 610 (1826).

Encelia paucifolia Walp. Linnaea xiv. 505 (1840) [err. cler.].

Encelia pilocarpa Rusby, Bull. N. Y. Bot. Gard. viii. 131 (1912).

Specimens examined: PERU: Arequipa, 8 Aug. 1901, *Williams* 2526 (GN, type number of *E. pilocarpa*); without definite locality, *McLean* (G); CHILI: desert of Atacama, Sept.-Oct. 1890, *Morong* 1311 (FGN, distr. as *E. tomentosa* Walp.); sandy places near Caldera, May 1882, *Ball* (G). With no locality: *Wilkes Expl. Exp.* (N).

9γ. E. CANESCENS Lam. var. TOMENTOSA (Walp.) J. Ball. Apparently more frutescent; stem and the small broadly ovate blunt short-petioled leaves densely white-woolly.

Encelia tomentosa Walp. Linnaea xiv. 504 (1840).

Encelia canescens var. *tomentosa* J. Ball, Journ. Linn. Soc. xxii. 160 (1887).

Specimens examined: SOUTH AMERICA: *Wilkes Expl. Exp.*, without locality (N). Walpers says of his species: "e Chili misit Filter."

9δ. E. CANESCENS Lam. var. **oblongifolia** (DC.) Blake, n. comb. Leaves oblong-lanceolate to rhombic-ovate, somewhat less pubescent than in the typical form, about the shape of those of var. *parvifolia* but much less pubescent; heads apparently fewer, on much longer peduncles.

Encelia oblongifolia DC. Prod. v. 567 (1836).

Specimens examined: CHILI: Coquimbo, *Gaudichaud* 85 & 86 (G, COTYPE); Coquimbo, July-Aug. 1856, *Harvey* (G); without definite locality, *Gay* (G).

— — Pubescence harsh; heads racemose, on peduncles about 3 cm. long; plant of the Galapagos Islands.

10. E. HISPIDA Anderss. Branching, erect, 0.6-1 m. high, canescent with a dense hispid pubescence, the branches striate; leaves oblong, cuneate at base, subentire or repandly toothed, 4-5 cm. long, 1.4-2.2 cm. broad, on spreading-hirtous petioles 1-1.8 cm. long, appressed-hirsutulous above, more densely so beneath particularly along the veins; heads racemose in inflorescences terminating the branches, the arcuate-spreading peduncles linear-bracted at base, 2-3.5 cm. long, densely villous-hispid; heads small, 8 mm. high, 9-11 mm. wide exclusive of rays; involucre 4-5 mm. high, the scales lanceolate, 2-seriate, somewhat unequal, densely villous-hispid, the outer a little loose; rays oval, tridentate, pubescent on the back, 4.2 mm. long; disk-corollas 3.5-4.5 mm. long, the short tube and teeth pubescent;

pales 4.7 mm. long, upwardly villous; achenes (not quite mature) narrowly obovate, 4.5 mm. long, villous on margin and pubescent medially on the sides.

Encelia hispida Anderss. Om Galap.-Öarnes Veg. 73 (1853).

Specimens examined: GALAPAGOS ISLANDS: dry grassy places, Chatham and Charles Islands, Andersson (G, TYPE COLLECTION).

++ Mature leaves cordate-ovate; plant of Lower California.

11. E. PALMERI Vasey & Rose. Suffrutescent, branched, 1 m. high, the stems whitened with a dense hispid pubescence, the branches rather sharply angled; leaves broadly ovate, cordate or rarely truncate at base, rounded or obtuse at apex or the younger acute, hispid-canescens on both sides or sometimes almost velutinous, entire or with blunt triangular teeth, 1.5-4 cm. long, 1.1-3.5 cm. broad, on petioles 3-10 mm. long, with ampliated base; heads peduncled, several in a glandular-hispid paniculate inflorescence, the bracts minute; disk 1-2 cm. broad; involucle 1 cm. high, the rather loose scales lanceolate to linear-lanceolate, triseriate, somewhat unequal, glandular on the back, densely villous on sides nearly to tip, somewhat pubescent inside; rays about 20, 10 mm. long, broadly oval, slightly trilobed, pilose on tube and back; disk-corollas 5 mm. long, nearly glabrous, the disk brownish purple; pale 8 mm. long, glandular-pubescent on the back above; achenes 4.5 mm. long, villous on the angles and slightly pubescent down the midline of the sides.

Encelia Palmeri Vasey & Rose, Proc. U. S. Nat. Mus. xi. 535 (1889).

Specimens examined: LOWER CALIFORNIA: Lagoon Head, 6-15 Mar. 1889, Palmer 805 (FGN, TYPE COLLECTION); San José del Cabo, Mar.-June 1897, Anthony 326 (GN); La Paz, 20 Jan.-5 Feb. 1890, Palmer 15 (GN).

*** ANGUSTIFOLIAE. Leaves narrowly linear; awns present; disk yellow.

← Leafy-stemmed; heads solitary, terminal; leaves glabrous beneath.

12. E. ANGUSTIFOLIA Greenm. An herbaceous perennial, the stems several, erect, 3-4 dm. high, striate, purplish below, slightly pubescent above, from a woody root; leaves scattered, narrowly linear, attenuate, subsessile, with 3 strong somewhat reticulated nerves, glabrous or nearly so below, appressed-hirsutulous above, 2.5-8 cm. long, 1.5-2.5 mm. wide, remotely serrulate; heads pedunculate, solitary, terminating the stems, about 1 cm. high, the peduncle bearing a slender bract just below the head; scales apparently few and rather loose, lance-attenuate, ciliate, 1-2-seriate; rays about 5, oblong, barely tridentate, 15 mm. long, 4 mm. wide; disk-corollas

rather few, 5.5 mm. long, pubescent on tube and teeth; pales 8 mm. long, pubescent; immature achene 2.5 mm. long, villous on the margin and slightly pubescent on the sides, bearing 2 upwardly pubescent awns about its own length.

Encelia angustifolia Greenm. Proc. Am. Acad. xxxix. 110 (1903).

Specimen examined: TERRITORY OF TEPIC: in the Sierra Madre, 13 Aug. 1897, Rose 3453 (G, TYPE COLLECTION).

← → Seapose; head solitary, terminal; leaves puberulent both sides.

13. E. SCAPOSA Gray. Herbaceous perennial, simple and erect, 3.5 dm. high, the leaves all clustered at the base, the monocephalous scape naked except for two linear bracts; the lowest leaves scalelike; leaves linear, 3.5-8.5 cm. long, 1.5-4 mm. wide, attenuate, subsessile, with whitish cartilaginous margin and tip, rough-puberulent both sides; scape puberulent especially above, striate, whitish; head 1 cm. high, 2 cm. wide excluding the rays; scales linear-lanceolate, subequal, about 2-rowed, rather loose, white-hispid on the back; rays pubescent on tube and back, apparently rather numerous, oval, 15 mm. long, 6 mm. wide; disk-corollas 5 mm. long, pubescent on teeth and short tube; pales 10 mm. long, rather narrow, about 9-nerved, pubescent above; immature achenes 4.5 mm. long, pubescent on the sides, villous on margin and top, as are the two awns which are about as long.

Simsia? (*Geraea*) *scaposa* Gray, Pl. Wright. ii. 88 (1853).

Encelia scaposa Gray, Proc. Am. Acad. viii. 657 (1873).

Specimen examined: NEW MEXICO: stony hills between the Mimbres and the Rio Grande, Oct. 1851, C. Wright (G, TYPE COLLECTION).

← → Heads numerous, paniced; plant resinous.

14. E. STENOPHYLLA Greene. Perennial, the stems several and erect from a somewhat branched woody base bearing the scars of former leaves, more or less glutinous; leaves mostly crowded toward the bases of the stems, linear, 4.5-8 cm. long, 1-2 mm. wide, mucronulate, somewhat fleshy, glutinous, slightly hairy along the margin, the edges more or less revolute; heads corymbose-paniced toward tip of stem, on peduncles 1-3 cm. long; disk 8 mm. high, 7-11 mm. wide; involucre 3.5-4 mm. high, the scales lance-ovate, about 3-seriate, somewhat unequal, resinous and slightly ciliate, rather strongly ribbed; rays about 6, oval, entire, resin-dotted on tube and back, 5.5 mm. long; disk-corollas 4.5 mm. long, resin-dotted, the throat broadly oblong; pales 7.5-8.3 mm. long, rounded at tip, resin-dotted;

achene 5 mm. long, villous all over, the awns 2 mm. long, upwardly pubescent.

Encelia stenophylla Greene, Bull. Torr. Club, x. 41 (1883).

Specimens examined: LOWER CALIFORNIA: Cedros Island: *Veatch* (GF, TYPE COLLECTION); 3 May 1885, *Greene* (G); 18–20 Mar. 1889, *Palmer* 734 (FGN); Mar.–June 1897, *Anthony* 309 (FGN); 7 Apr. 1897, *Brandegee* (F).

TRANSFERRED AND DOUBTFUL SPECIES.

Encelia adenophora Greenm. Proc. Am. Acad. xxxix. 109 (1903) is to be transferred to *Simsia*.

Encelia amplexicaulis Hemsl. Biol. Centr.-Am. Bot. ii. 183 (1881) is a synonym of *SIMSIA AMPLEXICAULIS* (Cav.) Pers.

Encelia calva Gray, Proc. Am. Acad. viii. 658 (1873), is a synonym of *SIMSIA CALVA* Gray.

Encelia cedrosensis Rose, Contr. U. S. Nat. Herb. i. 17 (1890) = *VERBESINA HASTATA* Kell. (*V. venosa* Greene).

Encelia Chaseae Millsp. in Millsp. & Chase, Field Col. Mus. Bot. iii. 125 (1904), is to be transferred to *Simsia*.

Encelia collodes Greenm. Proc. Am. Acad. xxxix. 110 (1903), from Chiapas = *FLOURENSIA collodes* (Greenm.) Blake, n. comb. Habit very much like that of *F. laurifolia* DC., but heads fewer and radiate; immature achenes villous, the two awns united at base to several slender lacerate squamellae.

Encelia Conzattii Greenm. l. c. 111 (1903) = *VERBESINA HYPOGLAUCA* Sch. Bip. (as noted by Greenman in Gray Herb.).

Encelia cordata Hemsl. l. c. 183 (1881) is a synonym of *SIMSIA CORDATA* (HBK.) Cass.

Encelia dentata Poir. Encycl. Suppl. v. 665 (1817) = *VERBESINA DENTATA* (Humb. & Bonpl.) HBK.

Encelia exaristata Gray in Hemsl. l. c. 183 (1881) = *SIMSIA EXARISTA* Gray.

Encelia foetida Hemsl. l. c. 183 (1881) is a synonym of *Coreopsis foetida* Cav., which is a *Simsia*.

Encelia fruticulosa Hieron. Bot. Jahrb. xix. 54 (1894) is based as to name on *Hopirkia fruticulosa* Spreng. Sys. iii. 444 (1826), which is also *Armania fruticulosa* Bert. in DC. Prod. v. 576 (1836), a species not identified but certainly a *Simsia*. Hieronymus has renamed his specimens *Encelia Sodiroi*, q. v.

Encelia Ghiesbreghtiana Hemsl. l. c. iv. 57 (1887) is a clerical error for *E. Ghiesbreghtii* Gray.

Encelia Ghiesbreghtii Gray, Proc. Am. Acad. viii. 658 (1873), is to be transferred to *Simsia*.

Encelia glutinosa Rob. & Greenm. Am. Journ. Sci. ser. 3. l. 155 (1895) from Oaxaca = *FLOURENSIA glutinosa* (Rob. & Greenm.) Blake, n. comb. Habit much as in *F. collodes*, but petioles and young branches tomentose, heads numerous and corymbbed, and the decidedly villous young achenes 2-awned but without squamellae.

Encelia grandiflora Hemsl. l. c. ii. 184 (1881) is a synonym of *SIMSIA GRANDIFLORA* Benth.

Encelia heterophylla Hemsl. l. c. 184 (1881) is a synonym of *SIMSIA HETEROPHYLLA* (HBK.) DC.

Encelia hirsuta Ktze. Rev. Gen. iii. pt. 2. 145 (1898), including *f. radiata* Ktze. l. c., is to be transferred to *Simsia*.

Encelia hispida Hemsl. l. c. 184 (1881) is a synonym of *SIMSIA HISPIDA* (HBK.) Cass.

Encelia hypargyrea Rob. & Greenm. Am. Journ. Sci. ser. 3. l. 155 (1895), from Oaxaca and Puebla, = *VIGUIERA argyrophylla* Blake, n. nom. (not *V. hypargyrea* Greenm. Proc. Am. Acad. xxxix. 105 (1903)). Pappus of two awns with several short fimbriate scales between; achene thickened and appressed-pubescent.

Encelia lagascaformis Gray in Hemsl. l. c. 184 (1881) = *SIMSIA LAGASCAEFORMIS* DC. (as to name only).

Encelia maculata Brandeg. Zoe v. 259 (1908), from Puebla and Oaxaca = *VIGUIERA maculata* (Brandeg.) Blake, n. comb. Pappus and achene of *Viguiera*. Related to *Viguiera eriophora* Greenm. The specimens examined (*Purpus* 4127) have the ray-flowers stylerous.

Encelia megacephala Sch. Bip., a nomen in Ktze. Rev. Gen. iii. pt. 2. 145 (1898), is a *Simsia*.

Encelia mexicana Mart. in DC. Prod. v. 578 (1836) is a synonym of *SIMSIA AURICULATA* DC.

Encelia microcephala Gray, Proc. Am. Acad. viii. 657 (1873) = *HELIANTHELLA MICROCEPHALA* Gray, l. c. xix. 10 (1883).

Encelia microphylla Gray, l. c. xv. 37 (1880), from Coahuila = *FLOURENSIA microphylla* (Gray) Blake, n. comb. Habit of *Flourensia*; achene somewhat thickened (perfectly ripe fruit not seen), densely villous in the manner of *F. laurifolia* DC., with or without a pappus of 2 upwardly pubescent awns. The likeness to *Flourensia* of this species was commented on by Dr. Gray (Proc. Am. Acad. xix. 7, and Syn. Fl.).

Encelia montana Brandeg. Univ. Calif. Pub. Bot. iii. 394 (1909), from Cerro de Paxtle, Puebla (*Purpus* 3103) = *VIGUIERA HELIAN-*

THOIDES HBK. The ray-flowers are described as neutral by Brandegee, but in the specimens of the type collection examined are styliferous but undoubtedly sterile.

Encelia nivea Benth. Bot. Voy. Sulph. 27 (1844) has been variously identified, but from the opposite leaves and the thickened achenes cannot have been an *Encelia*, and was probably a *Viguiera*.

Encelia oblonga Rob. & Fern. Proc. Am. Acad. xxx. 118 (1894), from Durango and Chihuahua, is a synonym of *Helianthella Pringlei* Gray, Proc. Am. Acad. xxi. 389 (1886). The species, an alternate-leaved frutescent plant with large heads solitary and long-peduncled at tips of stems, and involucre of ovate-based long-attenuate somewhat foliaceous bracts much exceeding the slightly resinous disk, is somewhat anomalous in appearance, but seems best referred to *Flourensia* as F. **Pringlei** (Gray) Blake, n. comb. The achenes are oblong, 11 mm. long, much thickened, striate, densely pubescent, and tend at maturity to lose the 2 awns which compose the pappus.

Encelia pilosa Greenm. l. c. xxxix. 111 (1903) is a synonym of *SIMSIA LAGASCAEFORMIS* DC.

Encelia pleistocephala J. D. Sm. Bot. Gaz. xiii. 189 (1888) = *VERBESINA PLEISTOCEPHALA* (J. D. Sm.) Rob. Proc. Am. Acad. xlivi. 41 (1907).

Encelia polycephala Hemsl. l. c. 184 (1881) is a synonym of *SIMSIA POLYCEPHALA* Benth.

Encelia Pringlei Fern. Proc. Am. Acad. xxxv. 573 (1900), from Hidalgo, has the pappus and achene of *Viguiera* and should be referred to that genus as *VIGUIERA trachyphylla* Blake, n. nom. (not *V. Pringlei* Rob. & Greenm. Proc. Am. Acad. xxix. 387 (1894)).

Encelia purpurea Rose, Contr. U. S. Nat. Herb. i. 336 (1895) = *SIMSIA LAGASCAEFORMIS* DC.

Encelia resinosa Brandeg. Zoe v. 240 (1906), from Hidalgo, an alternate-leaved resinous shrub with a few racemose axillary large heads, seems best referred to *Flourensia* as F. **resinosa** (Brandeg.) Blake, n. comb. The young achene is flattish, scantily haired on the sides and thickly at the apex, with two long awns disposed to be trifid from near the base.

Encelia rhombifolia Rob. & Greenm. Am. Journ. Sci. ser. 3. l. 155 (1895), from Oaxaca = *VIGUIERA rhombifolia* (Rob. & Greenm.) Blake, n. comb. Pappus of two awns with intermediate short squamellae; achene thickened and pubescent.

Encelia sanguinea Hemsl. l. c. 185 (1881) = *SIMSIA SANGUINEA* Gray.

Encelia sericea Hemsl. l. c. 185 (1881) is a *Simsia*.

Encelia Sodiroi Hieron. Bot. Jahrb. xxix. 43 (1900) is a *Simsia*.

Encelia squarrosa Greenm. Proc. Am. Acad. xxxix. 112 (1903), from Guerrero = *VIGUIERA squarrosa* (Greenm.) Blake, n. comb. Achene and pappus quite of this genus. A very distinct species.

Encelia stricta Seaton, Proc. Am. Acad. xxviii. 120 (1893), from Mt. Orizaba and Esperanza, Mexico = *VERBESINA Seatonii* Blake, n. nom. (not *V. stricta* (Hemsl.) Gray, l. c. xix. 13 (1883)). Closely related to *V. hypomalaca* Rob. & Greenm. and to *V. stricta* (Hemsl.) Gray; distinguished from the latter by the not scabrous under leaf-surface, and from the former by the shorter broader crenate-dentate leaves not cordate-clasping at the base.

Encelia subaristata Gray in Hemsl. l. c. 185 (1881) is a synonym of *SIMSIA SUBARISTATA* Gray.

Encelia suffrutescens R. E. Fries, Nova Act. Soc. Sci. Upsal. ser. 4. i. no. 1. 83. pl. 6. fig. 1-3 (1905), from northern Argentina = *FLORENSIA suffrutescens* (R. E. Fries) Blake, n. comb. Young achene plumpish, with two upwardly pubescent awns; habit of *Florensia*, the heads radiate but scarcely resinous.

Encelia tenuis Fernald, Proc. Am. Acad. xxxiii. 94 (1897) is a *Simsia*.

SIMSIA Pers. (dedicated to Jacob Sims, editor of Curtis' Botanical Magazine from 1784 to 1816).—Heads small or medium, radiate or discoid, the flowers yellow or purple. Involucral scales in 3 or 4 rows, subequal or distinctly seriate, lance-ovate to lance-linear. Receptacle slightly convex; pales scarious, stiff, acuminate, conduplicate about the achenes, persisting after the fall of the latter. Rays slightly bidentate, yellow or rarely purple, sometimes wanting; disk-corollas with short usually pubescent tube and cylindric throat, 5-toothed, yellow or purple, sometimes changing color with age. Style branches attenuate, hispid-villous. Disk-achenes strongly compressed, very flat, obovate or oblong, glabrous or more often appressed-pubescent, never villous, with thin unmargined edges, calvous or usually biaristate.—Annuals or sometimes perennials, with at least the lower leaves opposite, and usually paniculate heads. Type species *S. ficifolia* Pers. and *S. amplexicaulis* (Cav.) Pers., both reducible to *S. foetida*.—About 22 species of western America, from the arid southwestern part of the United States to Argentina; one species in Jamaica.

Simsia Pers. Syn. ii. 478 (1807), excl. *S. heterophylla* which = *Iostephane heterophylla* (Cav.) Benth.

Armania Bert. in DC. Prod. v. 576 (1836).

Barrattia Gray & Engelm. Am. Journ. Sci. ser. 2. iii. 274 (Mar. 1847).

KEY TO THE SPECIES OF SIMSIA.

A. Rays purple..... 22. *S. sanguinea*.
 A. Rays yellow or wanting.
 B. Leaves silky beneath.
 C. Achenes glabrous..... 19. *S. Ghiesbreghtii*.
 C. Achenes appressed-pubescent..... 20. *S. sericea*.
 B. Leaves densely canescent-tomentose beneath..... 8. *S. Sodiroi*.
 9. *S. pubescens*.
 B. Leaves neither silky nor densely canescent-tomentose beneath.
 C. Petiole-bases connate, forming foliaceous disks.
 D. Involucral scales subequal..... 1. *S. calva*.
 D. Scales 3-4-seriate.
 E. Leaves hastately lobed; stems glandular-setose..... 2. *S. setosa*.
 E. Leaves unlobed; stems merely glandular..... 3. *S. tenuis*.
 C. Petiole-bases not connate into foliaceous disks.
 D. Involucral scales 3-4-seriate, the outer ovate.
 E. Achenes glabrous and awnless.
 F. Petioles not auriculate..... 4. *S. exaristata*.
 F. Petioles auriculate..... 5. *S. submollicoma*.
 E. Achenes pubescent, 2-awned.
 F. Pales and scales purple-tipped; achene 5 mm. long..... 7. *S. lagascaeformis*.
 F. Pales scarcely purple-tipped; achenes 6-7 mm. long..... 10. *S. Chaseae*.
 D. Scales subequal, or the outer if shorter lance-oblong to linear-lanceolate.
 E. Leaves 3-lobed, the lobes narrow, sessile by a margined base; achene 5-6 mm. long..... 21. *S. triloba*.
 E. Leaves unlobed, or the lobes if present broad, and the achene 4-4.5 mm. long.
 F. Achenes 6-7.3 mm. long.
 G. Leaf blade broadly deltoid, abruptly narrowed to a broadly margined clasping base; Mexican..... 18. *S. megacephala*.
 G. Leaves not clasping, grayish beneath with tuberculate-based hairs; South American..... 14. *S. hirsuta*.
 15. *S. Dombeyana*.
 G. Leaves not clasping, densely glandular-dotted both sides; Jamaican..... 13. *S. jamaicensis*.
 F. Achenes 4-5.3 (-6) mm. long.
 G. Whole plant densely covered with stalked glands..... 12. *S. adenophora*.
 G. Glands less prominent.
 H. Involucral scales herbaceous, scarcely striate; leaves mostly lobed, generally auriculate-clasping; Mexican & Guatemalan..... 11. *S. foetida*.
 H. Scales corky-ribbed at base; heads large, disk 2-3 cm. in diameter; Central American..... 16. *S. grandiflora*.
 H. Scales not corky-ribbed; heads smaller, disk 1.2-1.7 cm. in diameter; Central American..... 17. *S. polycephala*.

SYNOPSIS OF SPECIES.

* Petiole-bases connate into conspicuous foliaceous stipule-like appendages; tuberous-rooted perennials, at least the first species.

← Involucral scales subequal; heads solitary, long-pedunculate, terminating the branches.

1. *S. CALVA* (Gray & Engelm.) Gray. Erect, much branched, from a thick woody tuberlike root, harsh with white bristle-like hairs with swollen bases intermixed with a fine puberulence, the stem and branches striate-grooved; leaves opposite usually to tips of the branches, very harsh with a double pubescence like that of stem, lance-deltoid in outline, acute at apex, somewhat cordate at base, crenate-dentate, unlobed or hastately eared or deeply trilobed, 3-5 cm. long, 1.5-4 cm. wide, on short margined petioles 7-12 mm. long, their bases united into broad entire or lobed foliaceous disks; heads solitary on long naked peduncles terminating the branches, the disk 1-2.2 cm. wide; involucre 7-9 mm. high, the scales linear-lanceolate to linear-oblong, in about 3 rows, subequal or the outer series slightly shorter, densely hispid and covered with a fine puberulence, somewhat green-nerved; rays 20-30, yellow, somewhat livid without, oval, 8 mm. long, pubescent on tube and nerves of back; disk-corollas yellow, becoming purplish upwardly, puberulent, 6.5 mm. long, the tube very short; pales 8 mm. long, puberulent on back and sub-herbaceous tip; achene glabrous, emarginate, awnless, mottled with black and gray, 4.5 mm. long, 2.5 mm. broad.

Barrattia calva Gray & Engelm. Am. Journ. Sci. ser. 2. iii. 275 (1847).

Simsia calva Gray, Pl. Lindh. ii. 228 (1850).

Encelia (Barrattia) calva Gray, Proc. Am. Acad. viii. 658 (1873).

Specimens examined: TEXAS: rocky bluffs, Baird, Apr. 1882, *Reverchon* (N); rocky terraces of limestone hills, under stunted live oaks, Comanche Spring, June 1849, *Lindheimer* 60 (G); Comanche Spring, June 1849, *Lindheimer* 900 (FGN); Brazos, *Sutton Hayes* 47 part (F); dry hills, local, Austin, 22 Oct. 1891, *J. E. Bodin* 192 (N); rocky soil, in open woods between the headwaters of the Guadalupe and Pedernales Rivers, Oct. 1845, *Lindheimer* 432 (G, TYPE); top of dry hills, Pedernales, 1847, *Lindheimer* 39 (G); summit of rocky hills, Upper Guadalupe, 1846, *Lindheimer* 142 (G) [= *Lindheimer* III 433: GN]; San Antonio, 28 July 1882, *Letterman* 5 (N); common in woods, San Antonio, 18 Sept. 1901, *Bush* 837 (N); Spring Creek, Gillespie Co., *G. Jermy* (F); Kerrville, alt. 487-610 m., June 1894,

Heller 1860 (N); *Bexar Co., Jermy* (N); foot of limestone hill, near *Bracken*, *Bexar Co.*, 28 July 1903, *B. H. A. Groth* 143 (FG); rocky bluffs, *Crockett Co.*, May 1885, *Reverchon* (FN); rocky bank, *Devils River*, 22 July 1900, *Earle* 439 (N); *Pinto*, 6 Sept. 1900, *Earle* 464 (N); *Roma*, 1889, *G. C. Neally* (N); southwestern Texas, 1879–80, *Palmer* 610 (GN), 611 (GN), 613 part (G); without definite locality, 1849, *Wright* 330 part (GN); "cultivated," *Hall* (N); *Mexican Boundary Survey under Emory*, 560 in part (N). *NUEVA LEÓN*: *Sierra Madre*, above *Monterey*, alt. 915 m., 17 Aug. 1903, *Pringle* 8739 (FGN); without definite locality, 1880, *Palmer* 615 part (N); *TAMAULIPAS*: *Matamoros*, April 1831, *Lindheimer* 2290 = 870 (G). Mexico, without definite locality, 1848–9, *Gregg* 85 (G).

1β. *S. CALVA* (Gray & Engelm.) Gray var. *subaristata* (Gray) Blake, n. comb. Similar in all respects to the last, except that the achenes are appressed-pubescent (sometimes only on the margin above) and usually provided with a pair of upwardly hispidulous awns, which may be reduced to mere traces.

Simsia subaristata Gray, Pl. Fendl. 84 (1849).

Encelia subaristata Gray in Hemsl. Biol. Centr.-Am. Bot. ii. 185 (1881).

Specimens examined: **TEXAS**: *Brazos*, *Sutton Hayes* 447 part (G); dry hills, *Austin*, 20 May 1872, *Hall* 339 (GN); *Guadalupe*, 20 miles W. of *San Antonio*, 1880, *Palmer* 612 (GN); *Eagle Pass*, *San Antonio*, &c., 1882, *Havard* 57 (G); *San Angelo*, 18–19 May 1899, *W. L. Bray* 356 (N); without definite locality, 1849, *Wright* 330 part (G); southwestern Texas, 1880, *Palmer* 613 part (N); *Mex. Bound. Surv. under Emory*, 560 part (N). **TAMAULIPAS**: *Matamoros*, Apr. 1836, *Lindheimer* 3010 = 1510 part (G); *San Fernando* to *Jimenez*, 26–27 Feb. 1902, *Nelson* 6603 (GN); **NUEVA LEÓN**: *Bishops Hill* near *Monterey*, 6 Feb. 1847, *Gregg* 47 (G, TYPE); *Pico Chico*, near *Monterey*, 18 Mar. 1900, *Canby, Sargent, & Trelease* 135 (N); **COAHUILA**: *Caracol Mts.*, S. E. of *Manclova*, 1880, *Palmer* 615 part (G).—Often occurs mixed with *S. calva* on herbarium sheets.

++ Scales 3–4-seriate, the outer much shorter; heads paniculate.
++ Leaves hastately lobed; stems bristly-hairy as well as glandular; heads 1.5 cm. high, 1 cm. broad.

2. *S. setosa* Blake, n. sp., herbacea (inferiore caulis parte ignota) ubique dense glandulosa et parce setosa pilis albis patentibus; foliis ovato-lanceolatis basi sinu lato leviter cordatis et hastato-lobatis dentato-crenatis maximis 9 cm. longis 6 cm. latis; petiolis anguste marginatis 3.5–4 cm. longis basi in orbes dentatas latas conjunctis,

summis alternis denique minimis linearibus; capitulis paniculatis; disco 11–15 mm. alto 8–12 mm. diametro; involucri squamis 4-seriatis exterioribus sensim brevioribus striatis margine et apice minute glanduloso-strigosis lanceolatis interioribus lanceolato-attenuatis disco subaequalibus; radii ca. 12 oblongo-ovalibus flavis 6.5 mm. longis; disci flosculis 8 mm. longis (tubulo 1.5 mm.) puberulo-glandulosis flavidis denique purpurascenscentibus; paleis 11.5 mm. longis lateraliter sublaceratis dorso et apice subherbaceo acuminato glandulosopubescentibus; achenis 5 mm. longis 2.4 mm. latis appresse pubescentibus interdum subglabris supra ciliatis calvis vel cum aristis 2 tenuibus sursum ciliatis ad 2.2 mm. longis.

Specimens examined: SONORA: Alamos, 16–30 Sept. 1890, *Palmer* 741 (COTYPES in Gray Herb. and Nat. Herb., no. 46131).—Distributed as *Encelia mexicana*, from which it is very distinct.

++ ++ Leaves unlobed; stems merely glandular; heads 9–10 mm. high, 5–7 mm. wide.

3. *S. tenuis* (Fernald) Blake, n. comb. Base and lowest leaves unknown; stem finely and thickly glandular, only the ultimate branches of the inflorescence somewhat setose; leaves deltoid-ovate, cordate with broad shallow sinus, acute, crenate, glandular-puberulent and somewhat strigose, on glandular and setose barely margined petioles 1–2.5 cm. long, with their bases united into rounded crenate foliaceous disks; inflorescence much branched, the branches slender, the very slender peduncles 2–10 cm. long; heads short-cylindric; scales 3–4-seriate, distinctly graduated, the outer ovate, the inner lance-acuminate, glandular-puberulent, ciliate above, striate-veined; rays about 8, yellow, oval, 6 mm. long, barely bidentate, hairy on tube and slightly pubescent on back; disk-corollas 5.8 mm. long, glandular-puberulent on tube and pubescent above, yellow becoming purplish; pales 7–8 mm. long, glandular-puberulent; achenes dark-mottled, appressed-pubescent, awnless, 5 mm. long, 3 mm. wide.

Encelia tenuis Fernald, Proc. Am. Acad. xxxiii. 94 (1897).

Specimens examined: GUERRERO; rather scarce on edge of a corn-field, Nov. 1894, *Palmer* 96 (FGN, TYPE COLLECTION).

* * Petioles sometimes auriculate, not connate at base into disks; annuals or perennials.

→ Rays yellow.

++ Involucral scales distinctly unequal, the outer ovate, 3–4-seriate.

= Achenes glabrous and awnless.

× Petioles not auriculate.

4. *S. EXARISTATA* Gray. Annual, erect, much branched above, the stem and branches striate, covered with a fine glandular pubescence

intermixed with long hairs; leaves mostly opposite, ovate, acute, cuneate-truncate to cordate at base, subentire, crenate, or sometimes rather sharply toothed, tuberculate-strigillose with some longer hairs intermixed, the blade 5–11 cm. long, 2.5–8.5 cm. wide, on nearly naked petioles 1–7 cm. long, glandular-puberulent and fringed with long white hairs; heads numerous, paniculate, the bracts linear-lanceolate or broader; disk 1–1.3 cm. high, about as broad; involucre nearly or quite equaling the disk, about 3-seried, the inner scales lance-acuminate, the outer ovate or ovate-oblong and half their length, all striate, glandular on the back, ciliate particularly toward the tip, purple-tipped, the inner mostly purple; rays about 8, oval-oblong, under 8 mm. long, subentire, yellow, apparently sometimes wanting; disk-corollas 7 mm. long, glandular-puberulent particularly on tube and teeth, yellow turning purplish with age; pales 9–10 mm. long, narrow, glandular-puberulent and ciliate on the back and tip; achene blackish, glabrous and awnless, nearly truncate at apex, 4.5 mm. long, 2.3–2.8 mm. broad.

Simsia exaristata Gray, Pl. Wright. ii. 87 (1853).

Encelia exaristata Gray in Hemsl. Biol. Centr.-Am. Bot. ii. 183 (1881).

Specimens examined: TEXAS: valleys in the mountains east of El Paso, 1849, Wright 331 (GN); ARIZONA: Mexican Boundary Line, south of Bisbee, 14 Sept. 1892, Mearns 873 (N); southern part, 1881, Lemmon 575 (G); NEW MEXICO: southern part, *Mex. Bound. Surv. under Emory*, 561 (N). SONORA: valley of a tributary of the San Pedro, Sept. 1851, Wright 1224 (GN, TYPE COLLECTION); sandy places, Sept. 1851, Thurber 953 (G); CHIHUAHUA: valley near Chihuahua, 19 Sept. 1885, Pringle 321 (FGN); VERA CRUZ: Orizaba, Botteri 804 (G).

5. *S. submollicoma* Blake, n. sp., herbacea caule ramisque striatis puberulo-pilosus ad nodos canescens; foliis fere omnibus oppositis ovato-deltoides cordatis sinu lato breveque vel superioribus truncatis crenato-dentatis paullulo hastato-lobatis acutis infra dense submoliterque pubescentibus pilis brevibus patentibus in venis longioribus supra subcanescensibus pube subsimile autem appressa asperaque 4–6 cm. longis 3–5.5 cm. latis, petiolis immarginatis puberulo-pilosis 1–3 cm. longis; capitulis subcorymbosis ramos terminantibus juventate ut gemmis dense pilosis maturitate 10–14 mm. alto 9–11 mm. diametro; involucre 1 cm. altitudine squamis acutis purpurascensibus triseriatis puberulis subdense pilosisque interioribus oblongis exterioribus ovatis duplo brevioribus: radiis (an semper) 0; corollis disci

6.5 mm. longis (tubulo 2 mm.) infra glanduloso-puberulis supra glanduloso-pilosus flavis denique obscurantibus; paleis latis 9 mm. longis appresse pubescentibus dorso et apice ciliatis; achenis atris truncatis glabris calvis 4.5 mm. longis 2.8 mm. latis.

Specimens examined: TAMAULIPAS: weed in waste places, growing in clusters, vicinity of Tampico, alt. 15 m., 10 Mar.-19 Apr. 1910, Palmer 250 (TYPE in Gray Herb.).

× × Petioles auriculate.

6. *S. eurylepis* Blake, n. sp., herbacea foliis inferioribus et basi invisis; caule striato sparse puberulo et pilis longis mollibus nonnullis; foliis remotis maxima ex parte alternis ovatis acutis basi subtruncatis subintegris vel infra dentatis utrimque pubescentibus pilis brevibus patentibus basi tuberculatis venas secundum subhispidis, petiolo vix marginato puberulo-glanduloso ad basin latis in auriculas integras ampliato; capitulis plerumque glomeratis in pedunculis longis nudis terminalibus, eradiatis 1.2-1.4 cm. altitudine 1-1.5 cm. diametro; involucro discum subaequante 3-4-seriato squamis sensim gradatis interioribus oblongis 7-9.5 mm. longis 2-2.5 mm. latis extimis ovalibus 4.5 mm. longis 2.5 mm. latis acutis striatis puberulo-glandulosis et subpilosus supra purpureo-brunneis; corollis disci flavis denique purpurascens 8 mm. longis (tubulo 2.2 mm.) infra et in dentibus puberulis; paleis 8.5 mm. longis apice pilosis a latere subdentatis; achenis nigricantibus emarginatis calvis glabris 5.5 mm. longis 3.4 mm. latis.

Specimens examined: SAN LUIS POTOSI: district Cuidad del Maiz near Gallinas, Feb. 1888, C. & E. Seler 684 (TYPE in Gray Herb.).

= = Achenes pubescent and biaristate.

× Tips of pales and inner scales purple; leaves not tomentose beneath; Mexican.

7. *S. LAGASCAEFORMIS* DC. Annual, erect or rarely somewhat spreading, usually much branched; stems and branches striate, glandular-pubescent and pilose particularly near the nodes; leaves opposite below, alternate in the inflorescence, broadly deltoid-ovate, unlobed or rarely hastately 3-lobed, the margin crenate or subentire, acute, the base truncate or cordate with broad sinus, beneath granular-puberulent, pilose along the veins, or when young almost tomentose, above strigillose, the hairs tuberculate-based, intermixed with longer looser ones, the blades 3-12 cm. long, 2-13.5 cm. wide, on purplish naked glandular-puberulent pilose-fringed petioles 1.5-5 cm. long; heads numerous, cymose-panicked, the branches somewhat pilose and stipitate-glandular; heads cylindric becoming hemispheric, 10-12 mm. high, 5-8 mm.

wide; involucre nearly equaling the disk, its scales 3-ranked, striate, purple-tipped, glandular-puberulent, ciliate, the outer ovate, the inner oblong-lanceolate, all acute; rays 5–8, small, oval to oval-oblong, 5 mm. long, yellow; disk-corollas 5.5–6 mm. long, glandular-puberulent, yellow becoming purplish; pales truncate or retuse and mucronate, ciliate on back and tip, glandular, purplish above, striate, 6–8 mm. long; achene appressed-pubescent, mottled with brownish-gray and black, bearing 2 slender upwardly pubescent fimbriate-based awns, 5 mm. long, 2.5 mm. wide.—A photograph of the type of *Simsia lagascaeformis*, kindly sent me by M. C. de Candolle, who also writes that the achenes are hairy and biaestate (not glabrous as originally described), proves that this long-misunderstood species is identical with *E. pilosa* Greenm., which in all technical characters is the same as *E. purpurea* Rose. The latter species, known only from two plants collected by Palmer in 1891, and represented by sections in the Gray and National herbaria, seems to be merely a peculiarly branched and perhaps somewhat teratological condition, with very numerous capitula and somewhat flattened branches.

Simsia lagascaeformis DC. Prod. v. 577 (1836).

Encelia (Simsia) purpurea Rose, Contr. U. S. Nat. Herb. i. 336 (1895).

Encelia pilosa Greenm. Proc. Am. Acad. xxxix. 111 (1903).

Specimens examined: SAN LUIS POTOSI: alt. 1830–2440 m., 1878, Parry & Palmer 472 part (G); COLIMA: in a creek bottom, Colima, 9 Jan.–6 Feb. 1891, Palmer 1105 (GN, type collection of *E. purpurea*); PUEBLA: maize fields, Rio de San Francisco, Aug. 1909, Purpus 3826 (FGN); Tehuacan, 7 Nov. 1903, Holway 5340 (G); OAXACA: Las Sedas, alt. 1830 m., Sept. 1894, C. L. Smith 277 (N); between Coixtlahuaca and Tamazulapam, alt. 2000–2500 m., 12 Nov. 1894, Nelson 1937 (GN); valley of Etla, alt. 1700 m., 23 Oct. 1895, L. C. Smith 854 (G); Ocotlan, Dec. 1901, Conzatti & González 1263 (G); without definite locality, alt. 1750 m., July–Aug. 1900, Conzatti & González 1002 (G); 25 Oct. 1899, Holway 3740 (G); 17 Oct., 1899, Holway 3747 (G).

× × Pales and scales not purple-tipped, or else leaves densely canescent-tomentose beneath; plants of Yucatan, Columbia, and Ecuador.

◦ Leaves canescent-tomentose beneath; scales pilose.

8. S. **Sodiroi** (Hieron.) Blake, n. comb. Said to be suffrutescent and 2 m. high; stem and branches striate, short-pubescent and somewhat glandular; leaves all but the uppermost opposite, ovate-lanceolate, acute, truncate or subcordate at base, roughish with appressed

hairs above, canescent-tomentose beneath, crenate-serrate, 4-7.5 cm. long, 3-6 cm. wide, on puberulent-pilose wingless petioles 1-1.5 cm. long; heads rather closely corymbed at tips of branches, the short peduncles densely pubescent; heads 1.2 cm. high; involucre triseriate, the outer scales ovate, densely pilose, half the length of the oblong less pilose inner ones, all acute and striate; rays few, yellow, oblong, 8 mm. long,³⁹ disk-corollas 7 mm. long, pilose on tube and teeth, yellowish becoming darker; pales 9 mm. long, laterally somewhat toothed, pilose on back and tip; achenes 4.3 mm. long, 1.9 mm. wide, blackish, more or less appressed-pubescent on sides and tip, bearing 2 slender slightly ciliate awns.

Encelia mexicana Klatt, Engl. Bot. Jahrb. viii. 43 (1887), not Mart.

Encelia fruticulosa Hieron. l. c. xix. 54 (1894), not *Hopkirkia fruticulosa* Spreng. Sys. iii. 444 (1826), fide Hieron. Engl. Bot. Jahrb. xxix. 43 (1900).

Encelia Sodiroi Hieron. Engl. Bot. Jahrb. xxix. 43 (1900).

Specimen examined: COLUMBIA: open savannas of the Rio Dagua, Cauca, alt. 800 m., 15 July 1883, Lehmann 2964 (G). Reported also by Hieronymus from Ecuador, along the Guallabamba R. (type locality).

9. *S. pubescens* Triana. "Suffrutex erectus; ramis gracilibus, multi-angulatis, minute puberulo-hirtis; foliis inferioribus oppositis, superioribus alternis ovato-lanceolatis acutis dentato-serratis, supra pubescentibus, subitus dense pubescenti-canescensibus, deorsum subabrupte in petiolum longum attenuatis, petiolo basi auriculato-amplexicauli; involuci squamis striatis, dorso tenuiter pubescentibus, exterioribus ovatis, interioribus oblongo-lanceolatis, utrisque acutis; capitulis pedunculatis, laxe corymbosis; acheniis atris, alatis, oblongis, undique decumbenti-pilosis.

"Crescit altitudine 1400 metr. inter Tena et El Colegio, in devexis occidentibus Andium Bogotensis."

Simsia pubescens Triana, Ann. Sci. Nat. Bot. sér. 4. ix. 40 (1858).

This species, not since recognized, appears to differ from *S. Sodiroi* only in its auriculate-amplexicaul petioles and perhaps in the less pubescent scales of the involucre, and may be identical with that species, but in the absence of specimens it seems unwise to combine them.

³⁹ Described by Hieronymus as stylose, but neutral in the Lehmann plant which he refers to *E. Sodiroi*.

- Leaves merely puberulent beneath except along the veins; scales glandular-hispid.

10. *S. Chaseae* (Millsp.) Blake, n. comb. Herbaceous, the base unknown; stem and branches striate, glandular-hispid particularly in the inflorescence; only the lower leaves opposite, thin, ovate-deltoid, acute, broadly wedge-shaped at base, crenate-dentate with blunt teeth, above granular-scabrous, beneath rather softly puberulent and somewhat pilose along the veins, 5–6 cm. long, 3–5.5 cm. wide, narrowed into margined glandular-setose petioles 1.5 cm. or less long, the upper sessile and oblong-lanceolate; heads corymbose-paniculate, 1–1.2 cm. high; scales somewhat triseriate, the outer ovate-lanceolate, glandular-hispid, shorter than the lance-oblong inner ones which are glandular on back and ciliate toward tip; rays sometimes wanting, when present 8–10, yellow, elliptic, 4–7 mm. long; disk-corollas 5.5 mm. long, pubescent, yellow; pales 8–9 mm. long, broad, the margin denticulate, green-ribbed, hispidulous on the keel; achenes 6–7 mm. long, 3.5–4 mm. broad, appressed-pubescent and short-ciliate, bearing two upwardly ciliate awns about half their length.

Encelia Chaseae Millsp. in Millsp. & Chase, Field Col. Mus. Pub. Bot. iii. 125, pl. (1904).

Specimens examined: YUCATAN: ruins of Kobah, 26 Nov. 1865, Schott 911 (TYPE no. 176020, Field Mus.); "herb, 5 feet high, common at Izamal, Oct.," Gaumer 910 (FG); Chichankanab, Gaumer 2045 (F); San Anselmo, Gaumer 2046 (F).

++ + Involucral scales subequal, or the outer if shorter linear-lanceolate to lance-oblong.

= Leaves ovate or ovate-deltoid, unlobed except in *S. foetida*, the lobes when present broad.

× Leaves not silky-pubescent beneath.

◦ Involucral scales herbaceous throughout, scarcely striate; the usually lobed leaves generally broadly auriculate-clasping at base of petiole; achenes small, 4–4.5 mm. long.

11. *S. foetida* (Cav.) Blake, n. comb. Annual, erect, often much branched, the stem usually purplish, glandular-puberulent and hispid with tuberculate-based hairs; lower leaves opposite, the upper often alternate, ovate or deltoid, often 3-lobed, particularly the upper, crenate-dentate, acute at apex, broadly cuneate or cordate at base, hispid with tuberculate-based hairs longer along the veins, the blade 5–14 cm. long, 3–12 cm. wide, the petioles usually margined, often broadly so, and generally auriculate-clasping at base; heads numerous, panicled, the peduncles glandular-hispid; heads 1 cm. high, radiate;

involucre equaling disk, the scales subequal, about 2-rowed, lance-acuminate, glandular-hispid, herbaceous nearly throughout, slightly or not at all striate, the inner sometimes purplish; rays about 10, yellow, oval, pubescent on tube, faintly bidentate, 10 mm. long; disk-corollas 6 mm. long (tube less than 1 mm.), puberulent, yellow turning purple; pales 9 mm. long, purplish and glandular above; achenes black or mottled, appressed-pubescent, 4-4.5 mm. long, 2-2.4 mm. wide, the 2 upwardly pubescent awns fimbriate at base.—Very variable in leaf-form, even on the same plant, but not satisfactorily divisible even into formae.

Coreopsis foetida Cav. Icon. i. 55. t. 77 (1791).

Ximenesia foetida Spreng. Sys. iii. 606 (1826).

Encelia foetida Hemsl. Biol. Centr.-Am. Bot. ii. 183 (1881).

Simsia ficifolia Pers. Syn. ii. 478 (1807).

Coreopsis amplexicaulis Cav. Descrip. 226 (1802).

Simsia amplexicaulis Pers. l. c. (1807).

Encelia amplexicaulis Hemsl. l. c. (1881).

Ximenesia cordata HBK. Nov. Gen. iv. 228 (1820).

Simsia cordata Cass. Diet. lix. 137 (1829).

Encelia cordata Hemsl. l. c. (1881).

Ximenesia heterophylla HBK. l. c. 227. t. 380 (1820).

Simsia heterophylla DC. Prod. v. 577 (1836), not Pers. l. c.

Simsia Kunthiana Cass. l. c. (1829).

Encelia heterophylla Hemsl. l. c. 184 (1881).

Simsia auriculata DC. l. c. v. 577 (1836).

Encelia mexicana Mart. in DC. l. c. 578 (1836), as syn.; Gray, Proc. Am. Acad. xix. 8 (1883).

Ximenesia hirta Mart. l. c. 578 (1836), as syn.

Helianthus amplexicaulis DC. l. c. 589 (1836).

Simsia Schaffneri Sch. Bip. in Gray, Proc. Am. Acad. xix. 8 (1883).

Specimens examined: CHIHUAHUA: southwestern part, 1885, Palmer 440 part (N); COAHUILA: Saltillo, Sept. 1898, Palmer 422 (FG); Parras, 16 May 1847, Gregg (G); Parras, Oct. 1898, Palmer 427 (FGN); without definite locality, 1880, Palmer 493 (GN); DURANGO: Durango, Sept. 1896, Palmer 657 (FGN); SAN LUIS POTOSI: Villa de Guadalupe, Sept. 1855, Schaffner 19 (G); sandy places near San Luis Potosi, Aug. 1876, Schaffner 265 (G); woods about San Luis Potosi, 1876, Schaffner 389b (G)⁴⁰; sandy cultivated grounds, 1880, Schaffner 389a (G)⁴⁰; alt. 1830-3050 m., 1878, Parry & Palmer

471 (GFN); alt. 1830–2440 m., 1878, *Parry & Palmer* 472 part (G); fields, Cardenas, 3 Nov. 1891, *Pringle* 5090 (G); JALISCO: Bolaños, Sept. 1897, *Rose* 2875 (G); Guadalajara, Oct. 1886, *Palmer* 622 (GN); fields near Guadalajara, 1 Nov. 1893, *Pringle* 4622 (FGN); GUANAJUATO: Leon, *Mendez* (G, fragments of type of *Helianthus amplexicaulis* DC.); 1895, *Dugès* 455 (G)⁴¹; QUERETARO: alt. 1800 m., 12 Dec. 1898, *Deam* (F); HIDALGO: fields near Dublan, 2074 m., 19 Sept. 1902, *Pringle* 9897 (FGN); fields, Pachuca, Sept. 1905, *Purpus* 1542 (FGN); VERA CRUZ: La Luguna, 22 Jan. 1906, *Greenman* 33 (F); Orizaba, *Botteri* 805, 808 (G); on a volcanic mountain, near Tantoyca, 1858, *L. C. Ervendberg* 378 (G); near Orizaba, *Botteri & Sumichrast* 122 (G); MICHOACAN: Patzcuaro, 29 Oct. 1895, *C. & E. Seler* 1185 (G); MEXICO: fields, Salto de Aqua, Oct. 1905, *Purpus* 1541 (FGN); Ixtaccihuatl, Jan. 1903, *Purpus* (N); near Mexico City, *Berlandier* 927 (G, type collection of *S. auriculata* DC.); Valley of Mexico, 1848–9, *Schmitz* (G); fields, Valley of Mexico, Sept.–Oct. 1865–6, *Bourgeau* 850 (GN); Valley of Mexico, Aug. 1856, *Schaffner* 162 (G, type of *S. Schaffneri* Sch. Bip.); near San Angel, *Schaffner* (G); Tacubaya, 20 June 1865–6, *Bourgeau* 155 (G); plaza, Chalchicomula, 27 July 1901, *Rose & Hay* 5808 part (G); PUEBLA: Mt. Orizaba, alt. 2440 m., 14 Aug. 1891, *Seaton* 329 (FGN); Cholula, 1 Jan. 1899, *Deam* 73 (FG); without definite locality, alt. 2000 m., Nov. 1895, *Conzatti* 131 (G); OAXACA: near Puebla, alt. 2135 m., 8 Nov. 1895, *L. C. Smith* 909 (G); CHIAPAS: plains, 1864–70, *Ghiesbreght* 540 (G). Mexico, without locality, *Hartweg* 145 (G); *Coulter* 359 (G); "Mexico Commu," 21 Sept. 1865–6, *Bourgeau* 959 (G); 1905, *Lemmon* (G). GUATEMALA: Dept. Quiché, alt. 1372–3660 m., Apr. 1892, *Heyde & Lux* 3396 (FG); Laguna Amatitlan, Dept. Amatitlan, alt. 1250 m., Feb. 1890, *Heyde & Lux* 2408 (F).

118. *S. FOETIDA* (Cav.) Blake var. *decipiens* Blake, n. var., pappo nullo, achenio glabro. As the typical form, but achene glabrous and pappusless; leaves mostly entire, but at least the upper auriculate-petioled.—It is barely possible that the specimen is a hybrid with *S. exaristata*, with which species it was identified by Dr. Gray; but the heads and leaf-bases are quite those of *S. foetida*.

Specimen examined: CHIHUAHUA: southwestern part, Aug.–Nov. 1885, *Palmer* 440 part (TYPE in Gray Herb.).

⁴¹ "Vulg. Mirasol amarillo ou Lampotillo" (i. e. yellow turnsol or little fire).

- ○ Scales somewhat corky basally, generally strongly striate; leaves very rarely lobed; achenes usually larger, 6-7 mm. long (except in nos. 12 and 17).
- + Whole plant densely covered with stalked glands; petioles never auriculate; achene 5.3 mm. long or less.

12. *S. adenophora* (Greenm.) Blake, n. comb. Erect annual, branched above, 1-2.5 m. high, setose and yellowish with dense stalked glands; lower leaves opposite, deltoid-ovate, rarely 3-lobed, acute, truncate or shallowly cordate at base, crenate-dentate, 6.5-12 cm. long, 5-13 cm. wide, setose and glandular both sides, on marginless densely glandular petioles 1-8 cm. long, never auriculate, the upper lance-acuminate, gradually reduced to linear-lanceolate bracts; heads panicled, rather numerous, 10-17 mm. high; involucre slightly exceeding disk, 3-rowed, the scales densely glandular-hispid, subequal, lanceolate, striate and somewhat corky-ribbed at base, the narrow herbaceous tips loosely spreading; rays when present yellow, about 12, 7-8 mm. long, 3.5 mm. wide; disk-corollas pubescent, 6 mm. long, yellow turning purplish above, the tube only 0.6 mm. long; pales 9 mm. long, laterally dentate, appressed-pubescent above; achenes blackish, 5-5.3 mm. long, 2.9 mm. wide, appressed-pubescent and slightly ciliate, with 2 finely and upwardly pubescent awns 3-4 mm. long.

Encelia adenophora Greenm. Proc. Am. Acad. xxxix. 109 (1903).

Specimens examined: JALISCO: fields and copses, Tequila, Sept.-Oct. 1893, Pringle 4602 (FGN, TYPE COLLECTION); Etzatlan, 2 Oct. 1903, Holway 5092 (G); MORELOS: limestone hills near Yautepec, alt. 1372 m., 21 Oct. 1902, Pringle 9898. (FGN); GUERRERO: between Tlapa and Tlaliscatilla, alt. 1190-1372 m., 5 Dec. 1894, Nelson 2045 (GN); OAXACA: Monte Alban, near Oaxaca City, alt. 1677-1830 m., 8 Oct. 1894, C. L. Smith 236 (N); hills of Soledad de Etla, alt. 1830 m., 19 Nov. 1895, L. C. Smith 894 (G); Hacienda Guadalupe, alt. 1600 m., 7 Oct. 1906, Conzatti 1529 (F); without definite locality, 10 Nov. 1903, Holway 5360 (G).

- + + Usually less glandular, the glands mostly sessile; petioles sometimes auriculate; achene usually 6-7 mm. long.
- Lower leaves (at least) not with broadly margined clasping bases; the upper sometimes cordate-clasping.
- A. Achenes 6-7.5 mm. long, or if smaller, the bracts strongly ribbed.
- B. Leaves rather densely glandular-dotted both sides; mature heads 1.5 cm. in diameter; achene 7 mm. long; Jamaican.

13. *S. jamaicensis* Blake, n. sp., herbacea erecta ramosa 1.3-2.5 m. alta foliis infimis et radice invisib; caule ramisque multistriatis hirsutis dense glandulosis praecipue in inflorescentia ubi glandulae pedatae sunt; foliis inferioribus late ovatis crenato-dentatis acutis basi cuneato-

truncatis 8–15 cm. longis 5.5–15 cm. latis utrobique pilis basi glandulosis tectis venas paginae inferioris secundum et supra ubique hirsutis, glandulis inferiore in superficie conspicuoribus quam eis specierum affinium, petiolis immarginatis 2–4.5 cm. longis infra glandulari-hirsutis supra complanatis pilosis saepe basi subauriculatis; foliis summis sensim lanceolatis ad bracteas sessiles reductis; capitulis non paucis cymoso-paniculatis pedunculis 2–6 cm. longis dense glandulosis et patenti-hirsutis; disco 15–17 mm. alto maturitate 1.5 cm. aetate 18–24 mm. diametro; involucri biseriati squamis subaequalibus vel interioribus paullo longioribus oblongo-lanceolatis subobtusis striatis glandulosis et strigoso-hirsutis; radiis vel nullis vel ca. 10 ovalibus parvis flavis; corollis disci 6.5 mm. longis (tubulo 2 mm.) flavis puberulo-glandulosis; paleis 9–12 mm. longis ad apicem glandulosis viridicarinatis cuspidatis; acheniis 6–7.5 mm. longis 2.4–3.5 mm. latis nigricanti-maculosis appresse aliquid pubescentibus aristis 2 subaequalibus 4–4.5 mm. longis.

Specimens examined: JAMAICA: vicinity of Kingston, alt. 152 m., 29 Jan.–4 Feb. 1900, Clute 2 (COTYPES in Gray Herb. and Field Mus. no. 83001: distributed as "*Verbesina gigantea* Jacq.?"'); Kings House Grounds, alt. 183 m., 17 Nov. 1897, Harris 6953 (F); Hope Grounds, alt. 198 m., 4 Dec. 1901, Harris 8228 (F); Hope Road, 13 Jan. 1898, Harris 6989 (F); Long Mountain Road, alt. 91 m., 19 Nov. 1907, Harris 10001 (FN).

B B. Leaves grayish with short tuberculate-based hairs especially beneath; mature heads 1.5–2 cm. broad; achene 7 mm. long; South American.

14. S. **hirsuta** (Ktze.) Blake. n. comb. Erect branched annual 1–1.5 mm. high, the stem and branches substriate, glandular-puberulent and setose; lower leaves ovate, acute, subcordate or cuneate-truncate at base, repand-dentate to subentire, setose along the veins, roughish both sides with short white hairs with swollen bases, some gland-like particularly on the upper surface, 8 cm. long, 5 cm. wide, on puberulent-setose marginless petioles 1 cm. long, the uppermost sessile and lance-oblong; heads rather few, cymose-paniculate, on glandular-puberulent and setose peduncles 2.5–14 cm. long; heads chiefly discoid; involucre 10–13 mm. high, equaling the disk, its scales subequal, 2-rowed, lanceolate-subulate, striate, glandular-pubescent and hispid; disk-corollas 5 mm. long (tube 0.6 mm.), glandular-puberulent, yellow; pales 1 cm. long, glandular-puberulent above; achene mottled, appressed-pubescent all over, oblong, obcordate, 6.5–7 mm. long, 2.7–3.6 mm. wide, the upwardly pubescent awns 2.5 mm. long.

Encelia hirsuta Ktze. Rev. Gen. iii. pt. 2. 145 (1898).

Encelia hirsuta Ktze. f. *radiata* Ktze. l. c.

Specimens examined: ARGENTINA: Dique near Cordoba, Dec. 1891, Kuntze (N, COTYPES of *E. hirsuta* Ktze.). Also reported by Kuntze from Sierra de Cordoba, Argentina, Lorentz; Peru (f. *radiata*, leg. Dombey); and Cartagena, Columbia, Billberg.

15. S. *DOMBEYANA* DC. "Caule terete sparse hispido et inter setas minute puberulo-glanduloso, foliis superioribus alternis petiolatis late ovatis irregulariter repando-dentatis hinc inde sublobatis acutis utrinque setis hispidulis et puberulo-glandulosis, capitulis paucis breviter pedicellatis, invol. squamis lineari-lanceolatis acuminateis disco longioribus, ligulis paucis minimis, achaeniis obcordatis biaristatis margine ciliolatis.— in Amer. austr. verisim. in Peruvia legit Dombey. Petioli valde hispidi, setis ut in tota planta longis patulis mollibus. (v. s. comm. à Mus. reg. Par.)"

Simsia Dombeyana DC. Prod. v. 578 (1836).

M. Casimir de Candolle, to whom I sent fragments of Kuntze's cotypes of *E. hirsuta* for comparison with the Prodromus type of *S. Dombeyana*, states that the latter is distinguished by its more hairy achenes with awns nearly as long as the paleae, and by the more long-triangular leaves with the long hairs thinner and the short ones nearly pulverulent.

B B B. Leaves glandular-puberulent; heads large, 2-3 cm. in diameter, the rays rather prominent; the scales broader and more corky-ribbed than in any related species; achene 5-6 mm. long; Central American.

16. S. *GRANDIFLORA* Benth. Erect annual, 1.6 m. high, subsimple or branched above; stem and branches setose, striate, rather sparsely glandular-puberulent; lower leaves opposite, broad-ovate, acute, truncate at base, crenate or crenate-serrate, setose along the veins, glandular-puberulous both sides, the glands more prominent on the lower surface, 7-14.5 cm. long, 4.5-10 cm. wide, on naked glandular-setose petioles 1.5-8 cm. long; the upper decurrent into winged amplexicaul bases, the uppermost sessile, subentire, lance-ovate; heads few, axillary and terminal, hemispheric even in anthesis, the disk 1.5-2 cm. high, 2-3 cm. wide, equaled or slightly surpassed by the involucle; peduncles setose and glandular, 2-12 cm. long; involucle triseriate, the inner scales slightly longer, lance-ovate to ovate-oblong, subacute, glandular-hispid, with about 4 conspicuous light thickened ribs in the lower half, the central pair most prominent, the upper part herbaceous; rays oval, about 20, yellow, 9 mm. long, 4.2 mm. wide, rather prominent, usually present; disk-corollas 5.5-6 mm. long (tube 1.3 mm.), yellow, glandular; pales 9-10 mm. long, puberulent on keel

and margin above; achene blackish or dark-mottled, ovate-oblong, subobcordate, appressed-pubescent, 5–6 mm. long, 2.5 mm. wide, bearing 2 awns 4–5.5 mm. long.

¶ *Simsia grandiflora* Benth. Vidensk. Medd. Kjöbenh. for 1852. 92 (1853).

Encelia grandiflora Hemsl. Biol. Centr.-Am. Bot. ii. 184 (1881).

Specimens examined: NICARAGUA: very common on the high plateaus toward the Pueblos, Niquinohomo, Dept. of Granada, 13 Feb. 1903, Baker 2419 (GN); waste land near Granada, alt. 40 m., Jan. 1870, P. Levy 355 (Bot. Mus. Copenhagen); COSTA RICA (?): sunny pastures near Ojos de Agua,— 352 & 382 (G, ex herb. Klatt). There seems to be no place of this name in Costa Rica, and the town so called in Honduras may have been intended. Benthams type (*Oersted* 100) came from Volcan el Viejo, Nicaragua.

A A. Achene 5 mm. long; bracts not strongly ribbed; Central American.

17. *S. POLYCEPHALA* Benth. Base not seen; stem and the numerous branches densely glandular and pilose-hispid; middle leaves ovate or ovate-lanceolate, acuminate, truncate or subcordate at base, crenate-dentate, glandular-hispid both sides, 4–7 cm. long, 3.5–5 cm. wide, on nearly marginless densely glandular-hispid petioles 1.5–2.5 cm. long, with slightly enlarged bases; heads numerous, cymose-panicle, on glandular-setose peduncles 1–7 cm. long; disk 11–13 mm. high, 12–17 mm. broad; involucre nearly as tall, its scales tri-seriate, subequal or the outer a little shorter, glandular-hispid, oblong-lanceolate, bluntish, only slightly striate-ribbed; rays 5–7 mm. long, yellow; disk-corollas 6 mm. long (tube 1.5 mm.), yellow, glandular below, pubescent on the teeth; pales 8–10.5 mm. long, pubescent above, greenish toward the apex; achenes blackish, appressed-pubescent chiefly on margin and middle, 5 mm. long, 2.6–3.5 mm. wide, the awns 3.2 mm. long.

Simsia polycephala Benth. Vidensk. Medd. Kjöbenh. for 1852. 93 (1853).

Encelia polycephala Hemsl. Biol. Centr.-Am. Bot. ii. 184 (1881).

Specimens examined: GUATEMALA: Cerro Redondo, Dept. Santa Rosa, alt. 1372 m., Oct. 1894, Heyde & Lux 6160 (FGN); Chupadero, Dept. Santa Rosa, alt. 1600 m., Oct. 1892, Heyde & Lux 3810 (FG).

— — Even the lower leaves abruptly contracted to broadly margined clasping bases.

18. *S. megacephala* Sch. Bip. in herb., herbacea supra ramosa glandulari-pubescentes et praecipue in inflorescentia piloso-

hirsuta; foliis inferioribus deltoideis vel ovato-deltoides utrimque glandulari-hirsutis venas tres secundum praecipue, lamina 7-10 cm. longa lataque acuta infra abrupte fere truncate contracta in portionem petioliformem late marginatam media in parte 1.2-1.7 cm. basi 1.7-3.5 cm. latam, superioribus sensim ad bracteas ovatas reductis; capitulis non paucis axillaribus et terminalibus in pedunculis 4-14 cm. longis; disco 1.3-1.5 cm. alto 1.7-2.2 cm. diametro; involuero quam eo paullo breviore squamis 2-3-seriatis exterioribus paullo brevioribus acutis lanceolatis glandulari-hirsutis valde costatis; radiis ca. 20 flavis ovalibus 6.5 mm. longis; corollis disci flavis 5.5-6 mm. longis (tubulo 1 mm.) infra et in dentibus puberulis; paleis 9 mm. longis supra hirsutulis; achenio nigricante dense appresse pubescente 7.2 mm. longo 3.3 mm. lato aristis 2 sursum ciliatis basi fimbriatis 4 mm. longis.

Specimens examined: GUANAJUATO: near cultivated gardens, Cerro de Cuarto, Sept. 1903, *Dugès* 12 (G). Also the following cultivated specimens: Harvard Botanic Garden, 1866, "e sem. Hort. Par."; Botanic Garden of Deidesheim, Rhine-Palatinate, 25 Nov. 1859, *Schultz Bipontinus* (TYPE in Gray Herb.).

× × Leaves silky beneath.

◦ Achenes glabrous, awnless; branches puberulent and pilose.

19. S. *Ghiesbreghtii* (Gray) Blake, n. comb. Lower part of stem unknown; branches apparently few, opposite, like the stem purplish, glandular-puberulent and pilose; leaves all opposite, ovate-lanceolate, acuminate, truncate or subcordate at base, serrate, canescent above with a short glandular pubescence, silky with dense appressed hairs beneath, 4.5 cm. long, 2-2.5 cm. wide, on densely pilose marginless petioles a centimeter long; heads few or solitary towards tips of branchlets, the disk 10-11 mm. high, 10 mm. wide, equaled by the periclinium, this triseriate, the outer scales a little shorter, all subulate-linear, glandular-puberulent and pilose-hirsute; rays about 10, pale yellow, purplish-tinged outside, oblong, 11 mm. long, 4.6 mm. wide; disk-corollas yellow, puberulent particularly on tube, 6-6.5 mm. long (tube 1.2 mm.); pales 9.5 mm. long, pubescent on the subherbaceous keel above, very acute; immature achene 3.5 mm. long, oblong, glabrous and awnless.

Encelia (Barrattia) Ghiesbreghtii Gray, Proc. Am. Acad. viii. 658 (1873).

Encelia Ghiesbreghtiana Hemsl. Biol. Centr.-Am. Bot. iv. 57 (1887), clerical error for *E. Ghiesbreghtii* Gray.

Specimen examined: CHIAPAS: mountain forests, 1864-70, Ghiesbreght 568 (TYPE in Gray Herb.).

◦◦◦ Achenes appressed-pubescent, biaxiate; branches puberulent.

20. *S. sericea* (Hemsl.) Blake, n. comb. Herbaceous?, erect, the stem and nearly opposite branches slender, terete, striate, densely glandular-puberulent; leaves mostly opposite, lance-ovate, acuminate, truncate or slightly rounded at base, remotely and obscurely serrulate, densely glandular-strigillose above, softly silvery-silky beneath, 4-9 cm. long, 1.5-3.5 cm. broad, on densely glandular short-pilose petioles about 1 cm. long; heads rather few, corymbed toward tips of branches, on peduncles 2-5.5 cm. long; disk 1 cm. high, about as broad, exceeding the involucre; the latter triseriate, the scales graduated, the inner lance-attenuate, the outer ovate-lanceolate, glandular-puberulent and hispid-ciliate; rays "about 7," 1 cm. long; disk-corollas 6.5 mm. long, puberulent, yellow; pales 8 mm. long, stiff, scarious, acuminate, glandular-pubescent on keel and tip, laterally lacerate-dentate; achene 3.2 mm. long, 1 mm. wide, densely appressed-pubescent, the awns ampliate and lacerate toward the base, 1.5 mm. long.

Encelia (? *Simsia*) *sericea* Hemsl. Biol. Centr.-Am. ii. 185 (1881).

Specimens examined: GUATEMALA: Antigua, dept. Sacatapéquez, 13 Feb. 1905, Kellerman 4982 (GN) (distr. as *Viguiera helianthoides* HBK.). Hemsl's type (*Salvin & Godman* 133, in Kew Herb.) came from the Motagua Valley in Guatemala.

= = Leaves three-lobed, sessile, the upper reduced to lance-linear bracts; inflorescence few-headed, the peduncles very long.

21. *S. triloba* Blake, n. sp., verisimiliter herbacea; caule ad 1 m. alto tenui supra pauciramoso, ramis longissimis 1-3-capitulatis, utrisque purpureis substriatis glandulari-pubescentibus et praecipue in inflorescentia sparse pilos; foliis inferioribus oppositis ovatis 1 cm. supra basin trilobatis, lobo medio 2.5-4 cm. longo alteris 1 cm. sive minoribus, omnibus oblongis subdentatis vel integris, sessilibus basi subamplexicaule 1 cm. longo latitudine medium lobum aequante, glandulari-scabris et praecipue supra hirsutis pilis basi tuberculatis; foliis superioribus oblongo-lanceolatis amplexicaulibus sensim ad bracteas ovatas vel lineares reductis; capitulis paucis longe pedunculatis pedunculis nudis vel pluribracteatis; disco 12-13 mm. alto 13-15 mm. diametro quam involuero paullo longiore; squamis circa triseriatis striatis glandulari-pubescentibus subhirsutis linear-subulatis exterioribus brevioribus; radiis ca. 10 flavis ovalibus 7.5 mm. longis

latis; corollis disci 6.5-7.5 mm. (tubulo 1 mm.) longis flavis denique apice purpurascensibus glandulosis praecipue in tubulo; acheniis maculosis appresse pubescentibus pilis ferrugineis 5-6 mm. longis 2.8-3 mm. latis; aristis 2, 4 mm. longis.

Specimens examined: PUEBLA: rocky soil, Cerro de Paxtle, Sept. 1908, *Purpus* 3022 (FGN, COTYPES). Distributed as *Encelia heterophylla* (= *S. foetida*), from which it differs in size of achene, leaf-base, and whole character.

← → Rays purple.

22. *S. SANGUINEA* Gray. Stems several, erect from a woody root, 1 m. high or more, branched above, usually purplish, glandular-setose; lower leaves opposite, variable, hastately 3-lobed, with broadly margined cordate-clasping petiolar bases, crenate-dentate or sometimes cut-lobed, scabrous and glandular-setose both sides, 3-18.5 cm. long including petiole, about as wide across the lobes, the upper reduced to linear-lanceolate bracts; heads numerous, panicled, on peduncles 1-11 cm. long; disk 1-1.5 cm. high, mostly slightly surpassing the involucre; this 3-seried, the scales linear-subulate to lanceolate, striate, densely glandular, setose, the outer distinctly shorter; rays about 10, rich purple, oblong-oval, 6-10 mm. long; disk-corollas 5-8 mm. long, purple above, glandular-pubescent below, hairy on the teeth; pales 8.5-13 mm. long, narrow, glandular-pubescent toward the acute tip; achenes blackish, oval, barely obcordate, 4.5-6.5 mm. long, 2.5-3.5 mm. wide, more or less densely appressed-pubescent, bearing 2 teeth or 1 short smooth awn or 2 upwardly pubescent awns as much as 3 mm. long.

Simsia sanguinea Gray, Pl. Wright. i. 107 (1852).

Encelia sanguinea Hemsl. Biol. Centr.-Am. Bot. ii. 185 (1881).

Simsia erythranthema Sch. Bip. in Gray, Proc. Am. Acad. xix. 9 (1883), as syn.

Specimens examined: JALISCO: dry grassy slopes of the barranca near Guadalajara, 5 Nov. 1888, *Pringle* 1738 part (F: intermediate between this and the next); VERA CRUZ: hillsides, Chavarillo, 7 Sept. 1906, *Barnes, Chamberlain, & Land* 6 (F); Mirador, Consoquitla, Aug. 1841, *Liebmann* 492 (G); Mirador, without date, *Sartorius* (G); OAXACA: hills, Las Sedas, alt. 1830 m., 11 Aug. 1894, *Pringle* 5756 (G); El Parian, Etla, alt. 1200 m., Nov. 1898, *Conzatti & González* 899 (G); Santa Catarina, alt. 1000 m., 26 Dec. 1906, *Conzatti* 1652 (F); La Carbonera, alt. 2135 m., 20 Sept. 1895, *L. C. Smith* 817 (G); Monte Alban, alt. 1800 m., 18 Aug. 1897, *Conzatti & González* 403 (G);

valley of Oaxaca, alt. 1677–2287 m., 20 Sept. 1894, *Nelson* 1445 (N); same data, *Nelson* 1426 (GN). Temperate Mexico, without locality, mountains, *Ghiesbreght* 305 (TYPE in Gray Herb.).

223. *S. SANGUINEA* Gray var. *Palmeri* (Gray) Blake, n. comb. Similar in size, habit, pubescence, and inflorescence; leaves ovate-lanceolate, acuminate, contracted below the middle to a clasping base, subentire or coarsely dentate, unlobed or slightly three-lobed; heads mostly 1.5 cm. high, the scales generally linear-lanceolate and fully equaling the disk; achenes variable as in the last as to pubescence and awns, sometimes quite glabrous; rays mostly paler, violet to pale purple.

Encelia (Simsia) sanguinea Hemsl. var. (?) *Palmeri* Gray in Wats. Proc. Am. Acad. xxii. 427 (1887).

Specimens examined: JALISCO: thickets on sides of cañons, Rio Blanco, Sept. 1886, *Palmer* 602 (GN, TYPE COLLECTION); barranca of Guadalajara, alt. 1372 m., 29 Sept. 1903, *Pringle* 11513 (FGN); dry grassy slopes of barranca near Guadalajara, 5 Nov. 1894, *Pringle* 1738 part (GN: intergrading with the species).

DOUBTFUL AND TRANSFERRED SPECIES.

Simsia canescens Gray, Pl. Fendl. 85 (1849) = *GERAEA CANESCENS* T. & G.

Simsia frutescens Gray in Torr. Bot. Mex. Bound. 89 (1859) = *ENCelia FRUTESCENS* Gray.

Simsia ? heterophylla Pers. Syn. ii. 478 (1807) = *IOSTEPHANE HETEROPHYLLA* (Cav.) Benth.

Simsia hispida (HBK.) Cass. Dict. Sci. Nat. lix. 137 (1849). *Xi-menesia hispida* HBK. Nov. Gen. iv. 227 (1820). *Encelia hispida* Hemsl. Biol. Centr.-Am. Bot. ii. 184 (1881). This species, with "foliis alternis, sessilibus, ovato-oblongis, obsolete serratis, supra piloso-, subtus sericeo-hispidis," and hispidulous stem three-flowered at apex, has not since been recognized. The description points to a poorly developed *S. foetida*.

Simsia pastoensis Triana, Ann. Sci. Nat. sér. 4. ix. 40 (1858), from Columbia, has not since been identified. It seems to be related to *S. pubescens* Triana and *S. Sodiroi* (Hieron.) Blake. The original description reads thus: "Suffrutex, ramis teretibus sparse molliter pilosis et inter pilos puberulo-glandulosis asperulis; foliis summis alternis et subbracteiformibus, inferioribus oppositis breviter petiolaratis ovatis acutis serratis, supra sparse decumbenti-pilosus et glandu-

4 mm. loso-scabris, subtus secus nervos pilosis, inter nervos sparse pubescentibus, petiolo basi auriculato amplexicauli longeque pilis longiusculis villoso; involucri squamis lanceolatis, acutis, extus pilis longiusculis villoso-canescensibus, squamis exterioribus brevioribus; capitulis petiolatis [sic], corymbo laxo subpaniculato; acheniis decumbentipilosulis, margine alatis.

"Crescit prope *Ortega*, altitudine 1200 metr. in prov. *Pasto*."

Simsia scaposa Gray, Pl. Wright. ii. 88 (1853) = *ENCELIA SCAPOSA* Gray.

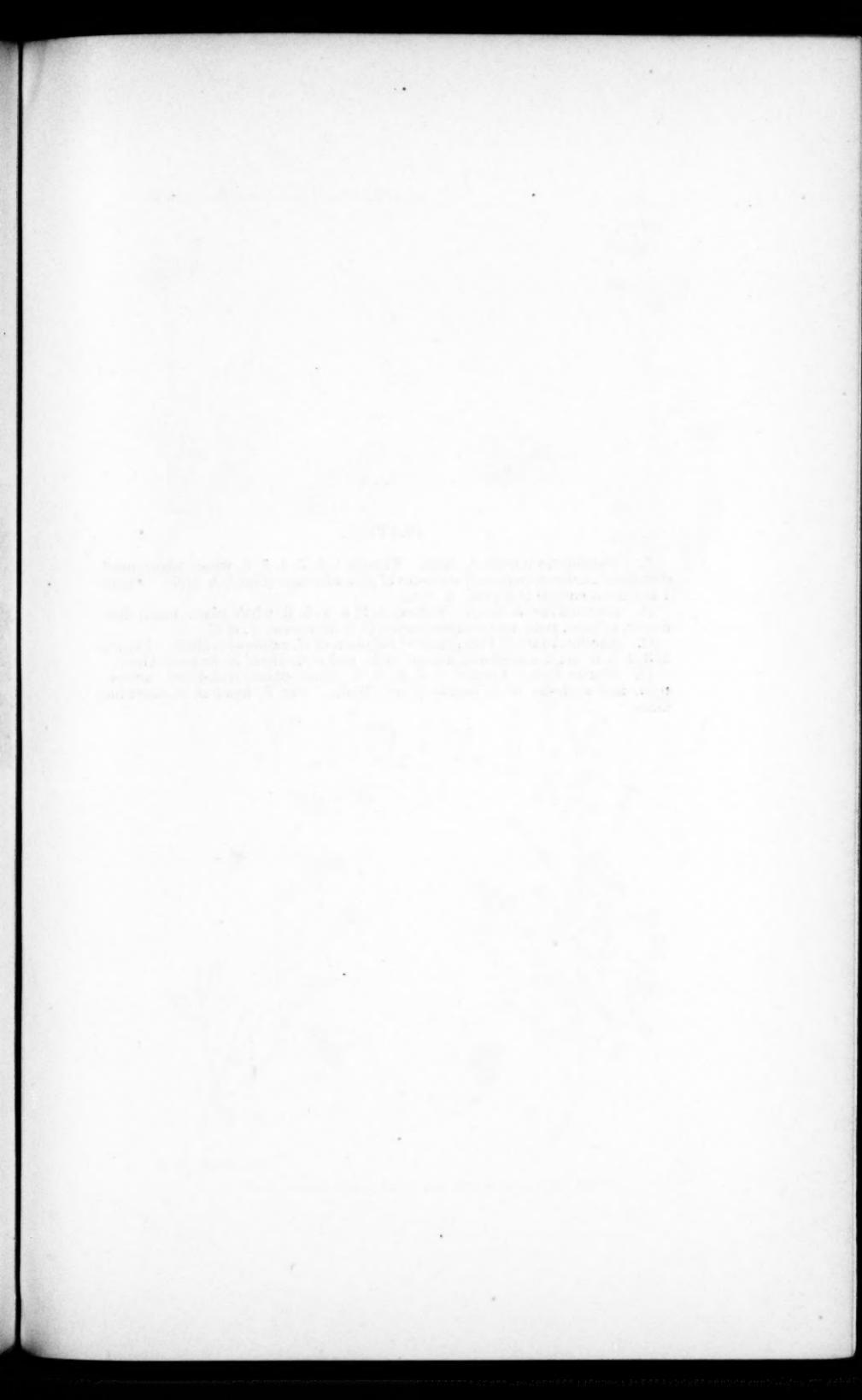


PLATE 1.

A. *Enceliopsis* (Gray) A. Nels. Figures 1, 2, 3, 4, 5, 6, whole plant, head, disk-floret, achene, pale, and style-tip of *E. nudicaulis* (Gray) A. Nels. Figure 1 is from a cotype of *E. tuta* A. Nels.

B. *Geraea* Torr. & Gray. Figures 1, 2, 3, 4, 5, 6, whole plant, head, disk-flower, achene, pale, and style-branches of *G. canescens* T. & G.

C. *Encelia* Adans. Fig. 1, portion of plant of *E. californica* Nutt. Figures 2, 3, 4, 5, 6, head, disk-floret, achene, pale, and style-tip of *E. farinosa* Gray.

D. *Simsia* Pers. Figures 1, 3, 4, 5, 6, whole plant, disk-floret, achene, pale, and style-tip of *S. foetida* (Cav.) Blake. Fig. 2, head of *S. exaristata* Gray.

BLAKE.—ENCELIA AND RELATED GENERA.



S. P. Blake, del.

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